

## **DELIBERA DEL DIRETTORE GENERALE**

**150 / 2021 del 15/04/2021**

**Oggetto: GRANT HORIZON 2020 - VALKYRIES - "HARMONIZATION AND PRE-STANDARDIZATION OF EQUIPMENT, TRAINING AND TACTICAL COORDINATED PROCEDURES FOR FIRST AID VEHICLES DEPLOYMENT ON EUROPEAN MULTI-VICTIM DISASTERS", FINANZIATO DALL'UNIONE EUROPEA. SOTTOSCRIZIONE ACCORDI E AVVIO DEL PROGETTO**

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**OGGETTO:** GRANT HORIZON 2020 - VALKYRIES - "HARMONIZATION AND PRE-STANDARDIZATION OF EQUIPMENT, TRAINING AND TACTICAL COORDINATED PROCEDURES FOR FIRST AID VEHICLES DEPLOYMENT ON EUROPEAN MULTI-VICTIM DISASTERS", FINANZIATO DALL'UNIONE EUROPEA. SOTTOSCRIZIONE ACCORDI E AVVIO DEL PROGETTO

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vista la seguente proposta di deliberazione n. 228/2021, avanzata dal Direttore della Struttura Complessa Economico Finanziario

### **IL DIRETTORE GENERALE**

**VISTA** la Legge Regionale 10 dicembre 2019 n. 22, che all'art.11 prevede l'istituzione dell'Agenzia Regionale Emergenza Urgenza (AREU), ne ribadisce l'autonomia organizzativa, amministrativa, patrimoniale, contabile, gestionale e tecnica e ne declina la *mission* identificandola con l'assicurazione dei *"LEA in materia di emergenza urgenza extraospedaliera, di attività trasfusionali (flussi di scambio e compensazione di sangue), di trasporti sanitari e sanitari semplici inclusi gli organi e i tessuti destinati ai trapianti, il coordinamento delle centrali operative integrate per la continuità assistenziale"* e con *"la programmazione e il controllo del Servizio NUE 1 1 2"*;

**PREMESSO** che i Programmi Quadro dell'Unione Europea (UE) sono il principale strumento con cui l'Unione Europea (UE) finanzia la ricerca in Europa e che Horizon 2020 (H2020) è il Programma Quadro per la ricerca e l'innovazione relativo al periodo 2014-2020 (durata settennale);

**PRECISATO** che H2020:

- unifica in un unico strumento finanziario programmi finalizzati a supportare la ricerca, l'innovazione e lo sviluppo tecnologico quale risposta alla spinta di capi di Stato e di governo della UE che hanno invitato la Commissione europea, per il periodo 2014-2020, a integrare in un quadro strategico comune i diversi strumenti dedicati a sostenere la ricerca e l'innovazione;
- si propone di contribuire, in particolare, alla realizzazione di una società basata sulla conoscenza e sull'innovazione, orientata verso le grandi priorità indicate dall'Agenda europea per il 2020: crescita intelligente, sostenibile e inclusiva, finalizzata a promuovere la competitività globale europea, favorendo la costituzione di partenariati per l'innovazione, il potenziamento delle iniziative di ricerca e la semplificazione amministrativa per l'accesso ai fondi di finanziamento;

**CONSIDERATO** che la partecipazione al programma è aperta a diverse tipologie di organizzazioni appartenenti agli Stati membri dell'Unione Europea o ai Paesi associati al programma, quali università e istituti di ricerca, ricercatori individuali all'inizio o nel corso della carriera, gruppi di ricerca, enti pubblici o governativi nazionali, regionali o locali, organizzazioni e associazioni no-profit, industrie, piccole e medie imprese (PMI) o raggruppamenti di imprese;

**VISTO** che, nell'ambito di H2020, è stato previsto il progetto dal titolo *"Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First*

*Aid Vehicles deployment on European multi-victim Disasters"*, con l'acronimo VALKYRIES, della durata prevista di 24 mesi, il cui coordinamento è affidato ad INDRA SISTEMAS SA, multinazionale spagnola nel settore IT e una delle principali in Europa ed America Latina, che si contraddistingue per gli importanti investimenti in ricerca e sviluppo;

**RAPPRESENTATO** che il Progetto VALKYRIES ha come finalità la standardizzazione e l'armonizzazione delle procedure, opportunamente definite e correttamente strutturate, nonché l'identificazione, progettazione, integrazione e sviluppo di strumenti per favorire l'uniforme gestione a livello europeo delle situazioni di emergenza (disaster resiliency);

**PREVISTO** che, nell'ambito descritto, H2020-VALKYRIES svilupperà ed integrerà le competenze dei partners coinvolti per identificare una metodologia che consenta una risposta alle emergenze che sia immediata e coordinata, da applicarsi in scenari di catastrofi che riguardino un gran numero di vittime, in cui siano interessate diverse regioni o nazioni e per le quali è quindi necessaria una maggiore interoperabilità;

**SPECIFICATO** che H2020-VALKYRIES prevede sia la progettazione che lo sviluppo di una piattaforma modulare, interattiva, accessibile e sicura che garantirà l'integrazione tra gli aspetti normativi e le nuove tecnologie, dinamica e continuamente aderente alle esigenze associate alla specifica situazione di emergenza, capace di supportare le operazioni in situazioni estreme in cui le consuete infrastrutture di comunicazione risultino non efficaci e per le quali sia necessario approntare gli interventi in situazioni di elevata incertezza;

**CONSIDERATO** che AREU ha valutato il vantaggio derivante dalla possibilità di condivisione degli outcomes del Progetto VALKIRIES per migliorare e modernizzare le tecniche di gestione di particolari missioni nonché acquisire nuove competenze da estendere tramite programmi di addestramento e formazione nel campo della gestione dell'emergenza extraospedaliera e territoriale, oltre all'utilità di lavorare in team internazionali e diversificati e di individuare nuove opportunità e nuove partnership;

**EVIDENZIATO** quindi che AREU ha sottoposto una specifica proposta di sviluppo della progettualità di che trattasi, in un ambito definito, ed è risultata ammessa quale partner per l'attuazione del progetto VALKIRIES, che annovera 17 soggetti partecipanti oltre a due ulteriori terze parti correlate;

**SOTTOLINEATO** che per la formalizzazione dell'adesione e partecipazione al Progetto è richiesta la sottoscrizione del Consortium Agreement (CA) e del Grant Agreement (GA), elaborati da INDRA SISTEMAS SA (soggetto coordinatore), documenti entrambi opportunamente verificati da tutti i partners e giunti all'elaborazione finale, qui allegata, al temine di una complessa fase istruttoria;

**RITENUTO** pertanto di procedere alla sottoscrizione del CA e del GA, conferendo il ruolo di firmatario della documentazione di progetto, su delega del Direttore Generale, al Direttore Sanitario Giuseppe Maria Sechi;

**PRECISATO** che il CA è concluso tra tutti i membri del Consorzio ed è strutturato secondo le regole dell'Unione Europea, integra la descrizione delle azioni, trattando argomenti rilevanti e necessari per l'attuazione del progetto, nonché la gestione dei conseguenti risultati;

**PREVISTO** che la realizzazione degli obiettivi definiti nel progetto VALKYRIES richiede investimenti in risorse umane, equipaggiamenti, beni di consumo, costi di viaggio ed altri costi, per un valore complessivo del contributo richiesto per il Consorzio all'Unione Europea di € 5.995.757,50, di cui AREU sarà beneficiaria della quota di € 408.125,00, importo dei costi valutati "eleggibili" sulla base del budget presentato a fronte delle attività programmate;

**CONSIDERATO** che per l'implementazione delle attività programmate sono state individuate, all'interno dell'organizzazione dell'Agenzia, alcune figure di riferimento (Point of Contact) e figure con funzioni specifiche, come dettagliato nella seguente tabella:

	Role	
Giuseppe Maria Sechi	Project Supervisor	
Marco Botteri	Scientific Consultant	Point of Contact
Alex Zambroni	Project Leader WP5 - T5.2	-
Greta Russo	Administration Contact	Point of Contact
Monica Ghinaglia	Health Advisor	Point of Contact
Maria Elena Galbusera	Financial Accountant	-

prevedendo che le stesse coordinino le necessarie attività, ciascuna secondo le proprie competenze ed il proprio ruolo;

**SEGNALATO** inoltre che per l'accesso ai rimborsi dei costi sostenuti, è prevista la rendicontazione periodica degli stessi, secondo le tempistiche e le modalità indicate dal Consorzio e dalla Unione Europea, accompagnata da una certificazione (Certificate on the Financial Statements (CFS)) rilasciata da un auditor qualificato, da sottoporre contestualmente al report economico finanziario (final financial report), che ne attesti la veridicità e la coerenza con il progetto validato, secondo i criteri indicati dall'Unione Europea;

**DATO ATTO** che gli oneri conseguenti al presente provvedimento risultano interamente finanziati dal contributo dell'Unione Europea, che verrà erogato a seguito di puntuale rendicontazione dei costi sostenuti, accompagnata dal CFS;

**RECEPITA** l'indicazione di procedere alla individuazione di un auditor qualificato al rilascio del CFS, riconoscendo un corrispettivo massimo dell'1% del valore del budget, precisando che il costo di che trattasi è costo eleggibile (finanziabile) all'interno del Grant, tra gli "other direct costs";

**PRESO ATTO** che il Proponente del procedimento attesta la completezza, la regolarità tecnica e la legittimità del presente provvedimento;

**ACQUISITI** i pareri favorevoli del Direttore Amministrativo e del Direttore Sanitario, resi per quanto di specifica competenza ai sensi dell'art. 3 del D.Lgs. n. 502/1992 e s.m.i.;

## DELIBERA

Per tutti i motivi in premessa indicati e integralmente richiamati:

- 1) di autorizzare la partecipazione di AREU al Grant, finanziato dalla Commissione Europea, Horizon 2020 – Valkyries – “*Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters*”;
- 2) di autorizzare il Direttore Sanitario, Giuseppe Maria Sechi, alla sottoscrizione del Consortium Agreement (CA) e del Grant Agreement (GA), qui allegati quale parte integrante e sostanziale del presente provvedimento;
- 3) di autorizzare i soggetti individuati ed indicati nella seguente tabella:

	Role	
Giuseppe Maria Sechi	Project Supervisor	
Marco Botteri	Scientific Consultant	<u>Point of Contact</u>
Alex Zambroni	Project Leader WP5 - T5.2	-
Greta Russo	Administration Contact	<u>Point of Contact</u>
Monica Ghinaglia	<u>Health Advisor</u>	<u>Point of Contact</u>
Maria Elena Galbusera	Financial Accountant	-

alla attuazione di tutte le azioni necessarie, ciascuno secondo le proprie competenze ed il proprio ruolo, per la completa attuazione del progetto presentato;

- 4) di dare mandato alla SC Gestione degli Approvvigionamenti per l'avvio della procedura di selezione di un auditor qualificato al rilascio del *Certificate on the Financial Statements*, per un corrispettivo massimo dell'1% del valore del budget, precisando che il costo di che trattasi è costo eleggibile (finanziabile) all'interno del Grant, tra gli "other direct costs";
- 5) di dare atto che gli oneri conseguenti al presente provvedimento risultano interamente finanziati dal contributo dell'Unione Europea, che verrà erogato a seguito di puntuale rendicontazione dei costi sostenuti, accompagnata dal CFS che ne attesti la veridicità e la coerenza con il progetto validato secondo i criteri indicati dall'Unione Europea;
- 6) di dare atto che, ai sensi della L. n. 241/1990, responsabile del presente procedimento è l'ing. Alex Zambroni;
- 7) di disporre che vengano rispettate tutte le prescrizioni inerenti alla pubblicazione sul portale web aziendale di tutte le informazioni e i documenti richiesti e necessari ai sensi del D.Lgs. n. 33/2013 e s.m.i., c.d. Amministrazione Trasparente;
- 8) di disporre la pubblicazione del presente provvedimento all'Albo Pretorio on line dell'Agenzia.

La presente delibera è sottoscritta digitalmente, ai sensi dell'art. 21 D.Lgs. n. 82/2005 e s.m.i., da:

Il Direttore Amministrativo Luca Filippo Maria Stucchi

Il Direttore Sanitario Giuseppe Maria Sechi

Il Direttore Generale Alberto Zoli

**VALKYRIES: Harmonization and Pre-Standardization of Equipment,  
Training and Tactical Coordinated procedures for First Aid Vehicles  
deployment on European multi-victim Disasters**

**CONSORTIUM AGREEMENT**

Project acronym: **VALKYRIES**

Project full title: **Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters**

Action no.: SU-DRS03-2018-2019-2020 (IA), subtopic 3

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THIS CONSORTIUM AGREEMENT is based upon

**REGULATION (EU) No 1290/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013** laying down the rules for the participation and dissemination in “**Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020)**” (hereinafter referred to as “Rules for Participation”), and the European Commission Multi-beneficiary General Model Grant Agreement and its Annexes, and is made on 1<sup>st</sup> of October of 2021 hereinafter referred to as the Effective Date

**BETWEEN:**

**Indra Sistemas, S.A.**, having its registered office at Avenida de Bruselas, 35, Alcobendas (Madrid, Spain, hereinafter referred to as “**INDRA**”, the “**Coordinator**”,

and the following other beneficiaries, subject to their execution of the Accession Form to the Grant Agreement attached to it as Annex 2:

**UNIVERSIDAD DE MURCIA**, with registered address at Avenida Teniente Flomesta 5 - EDIFIC, 30003 , Murcia, Spain, hereinafter the “**UMU**” and PIC number 999844282

**Center for Security Studies (KEMEA)**, with PIC number 999827307, established in P. Kanellopoulou 4 Street, Athens 10177, Greece, VAT number: EL999333507

**TASSICA EMERGENCY TRAINING & RESEARCH SA (TASSICA)** with PIC number 893309182 and registered address at CALLE JOSE ZORRILLA 132 1E 40002 , SEGOVIA Spain

**ISEM-INSTITUT PRE MEDZINARODNU BEZPECNOST A KRIZOVE RIADENIE, NO (ISEMI)** with PIC number 937551658 and registered address at VYSOKOSKOLAKOV 41po box: 000 010 08 , ZILINA Slovakia

**SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO S ANNA (SSS)** with PIC number 999884731 and registered address at PIAZZA MARTIRI DELLA LIBERTA 33 po box: 000 56127 , PISA Italy

**BLOCKCHAIN2050 BV (BC2050)** with PIC number 905461536 and registered address at Stationsplein 45 3013 AK , Rotterdam Netherlands

**INSTITUT PO OTBRANA (BDI)** with PIC number 958304323 and registered address at prof. Tsvetan Lazarov blvd. 2 1574 , Sofia Bulgaria

**BULGARIAN RED CROSS (BRC)** with PIC number 943195312 and registered address at 76 JAMES BOURCHIER BLVD po box: 1407 , SOFIA Bulgaria

**ARATOS NTOT NET LTD (ARATOS)** with PIC number 956343565 and registered address at ARTEMIDOS 36 po box: 000 175 61 , PALAIO FALIRO Greece

**HOSPITAL DO ESPIRITO SANTO DE EVORA EPE (HESE)** with PIC number 907543544 and registered address at LARGO SENHOR DA POBREZA 7000 811 , EVORA Portugal

**UNIVERSITETET I SOROST-NORGE (USN)** with PIC number 921767430 and registered address at KJOLNES RING 56 po box: 000 3918 , PORSGRUNN Norway

**Azienda Regionale Emergenza Urgenza (AREU)** with PIC number 984438354 and registered address at Via Alfredo Campanini 6 20124 MI , Milano Italy

**ELLINIKI OMADA DIASOSIS SOMATEIO (HRT)** with PIC number 971652202 and registered address at EMM PAPA 5 po box: 000 54 248 , THESSALONIKI Greece

**NOVOTEC CONSULTORES SA (NOVOTEC)** with PIC number 942174775 and registered address at CALLE CAMPEZO 1 EDIFICIO 3 PARQUE EMPRESARIAL DE LAS MERCEDES po box: 000 28022 , MADRID Spain

**PARTICLE SUMMARY (PARTICLE)** with PIC number 907400372 and registered address at RUA DA VENEZUELA N 29 14 E po box: 000 1500 618 , LISBON Portugal

hereinafter, jointly or individually, referred to as “**Parties**” or “**Party**”.

relating to the **Action** entitled: **SU-DRS03-2018-2019-2020 (IA), subtopic 3**

in short: **VALKYRIES**, hereinafter referred to as the “**Project**”.

#### **WHEREAS:**

The Parties, having considerable experience in the field concerned, have submitted a proposal for the Project to the Funding Authority as part of the Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020).

The Parties wish to specify or supplement binding commitments among themselves in addition to the provisions of the specific Grant Agreement to be signed by the Parties and the Funding Authority (hereinafter “Grant Agreement”).

#### **NOW, THEREFORE, IT IS HEREBY AGREED AS FOLLOWS:**

## 1 Section: Definitions

### 1.1 Definitions

Words beginning with a capital letter shall have the meaning defined either herein or in the Rules for Participation or in the Grant Agreement, including its Annexes.

### 1.2 Additional Definitions

**“Access Rights”** shall mean any specific right to use Foreground or Background of the other Parties, subject to and under the terms and conditions expressly laid down in this Consortium Agreement.

**“Affiliate”** shall mean any legal entity that is:

- under the direct or indirect control of a Party, or
- under the same direct or indirect control as a Party, or
- directly or indirectly controlling a Party.

‘Control’ may take any of the following forms:

(a) the direct or indirect holding of more than 50% of the nominal value of the issued share capital in the legal entity concerned, or of a majority of the voting rights of the shareholders or associates of that entity;

(b) the direct or indirect holding, in fact or in law, of decision-making powers in the legal entity concerned.

However, the following relationships between legal entities shall not in themselves constitute controlling relationships:

(a) the same public investment corporation, institutional investor or venture-capital company has a direct or indirect holding of more than 50% of the nominal value of the issued share capital or a majority of voting rights of the shareholders or associates;

(b) the legal entities concerned are owned or supervised by the same public body.

**“Background”** shall mean any data, know-how or information — whatever its form or nature (tangible or intangible), including any rights such as intellectual property rights — that:

(a) is held by a Party before they acceded to the Consortium Agreement, and

(b) is needed to implement the Project or exploit the Results.

Each Party’s Background is listed on a non-limitative basis in Attachment 1 of the Consortium Agreement, including any specific conditions/restrictions for its accession.

**“Classified Information”** shall mean any information or material designated by an EU/National security classification, the unauthorized disclosure of which could cause varying degrees of prejudice to the interests of the European Union or of one or more of the Member States (according to 2015/444/EC, Euratom).

**“Consortium”** shall mean all the Parties integrating the present Consortium Agreement together with any new party entering into this Consortium Agreement.

**“Consortium Body”** shall mean any management body described in Section 6 of this Consortium Agreement.

**“Consortium Agreement”** shall mean this consortium agreement together with its corresponding Attachments and any referenced document.

**“Consortium Plan”** shall mean the description of the action and the related agreed budget as defined in Annex 1 of Grant Agreement and which may be updated by the CoP.

**“Council of Partners (CoP)”** shall mean the Consortium Body described in Section 6 of this Consortium Agreement.

**“Deliverables”** shall mean and comprise the documents, prototypes, webpage, events, etc. which each Party agrees to submit for the Project and which are defined in more detail in Annex 1 of the Grant Agreement.

**“Defaulting Party”** shall mean a Party which the CoP has identified to be in breach of this Consortium Agreement and/or the Grant Agreement, as specified in Section 4.2 of this Consortium Agreement.

**“Fair and Reasonable conditions”** means the appropriate conditions to be agreed in good faith between the relevant Parties, taking into account the specific circumstances of each request for access and bearing in mind *inter alia* the actual or potential value of the Results or Background to which access is requested and/or the scope, duration or other characteristics of the exploitation envisaged. For the sake of clarity, such conditions may include the payment of a royalty or may be granted on a royalty-free basis.

**“Funding Authority”** shall mean the body awarding the grant for the Project through the Grant Agreement.

**“Grant Agreement”** shall mean the grant agreement formalized between the Parties and the Funding Authority for the carrying out of the Project, including any amendment or extension agreed thereof.

**“Intellectual Property Rights” or “IPR”** shall mean any intellectual property rights including but not limited to all rights in utility models, inventions, discoveries, designs, topographies, copyrights, author’s rights, brands, database rights, trade secrets, manufacturing or business processes, methods, procedures, know-how and other rights in information, trade and service marks, trade names, domain names, logos, plans, algorithms, drawings, specifications, technical-related documentation, any software, in each case whether registered or unregistered and including applications for registration, any renewals or extensions or improvements thereof and all rights or forms of protection having equivalent or similar effect anywhere in the world.

**“Linked Third Parties”** shall mean such Affiliates and third parties with a legal link to a Party which may implement the Tasks attributed to such Party, as specified in Article 14 of the Grant Agreement. A list of Linked Third Parties is included in Attachment 3.

**“Needed”**

means:

For the implementation of the Project:

Access Rights are Needed if, without the grant of such Access Rights, carrying out the tasks assigned to the recipient Party would be technically or legally impossible, significantly delayed, or require significant additional financial or human resources.

For Exploitation of own Results:

Access Rights are Needed if, without the grant of such Access Rights, the Exploitation of own Results would be technically or legally impossible.

**“Project Schedule”** shall mean the schedule to be followed in order to fulfil the objectives of the Project as defined in Annex 1 of the Grant Agreement.

**“Project Steering Team (PST)”** shall mean the Consortium Body described in Section 6 of this Consortium Agreement.

**“Results”** shall mean any (tangible or intangible) output of the Project such as data, knowledge or information — whatever its form or nature, whether it can be protected or not — that is generated in the Project by one Party or Several Parties, as well as any rights attached to it, including intellectual property rights.

**“Software”** shall mean sequences of instructions to carry out a process in, or convertible into, a form executable by a computer and fixed in any tangible medium of expression.

**“Subcontract”** shall mean any contract signed between a Party and a Subcontractor to provide supplies or services in support of the Project.

**“Subcontractor”** shall mean an economic operator who is under a Subcontract with a Party to provide supplies and/or services in support of the Project. An initial list of Subcontractors is included in Attachment 5.

**“Tasks”** shall mean the specific activities to be performed by each Party, as detailed and included in Annex 1 of the Grant Agreement, which may be further detailed and complete between the Parties involved in the relevant WP.

**“Work Package (WP)”**

The total work of the Project broken down into **Work Packages (WP)**, as detailed and included in Annex 1 of the Grant Agreement.

**“Work Package Leader (WPL)”** shall mean the Party designated in Annex 1 of the Grant Agreement to be in charge of the monitoring of corresponding WP.

## **2 Section: Purpose**

The purpose of this Consortium Agreement is to specify with respect to the Project the relationship among the Parties, in particular concerning the organisation of the work between the Parties, the management of the Project and the rights and obligations of the Parties concerning *inter alia* liability, Access Rights and dispute resolution (hereinafter referred to as the “Purpose”).

These rights and obligations shall specify and/or supplement but not be in conflict with those of the Grant Agreement. In case of conflict or contradiction, the terms and conditions of the Grant Agreement shall prevail.

## **3 Section: Entry into force, duration and termination**

### **3.1 Entry into force**

An entity becomes a Party to this Consortium Agreement upon signature of this Consortium Agreement by its duly authorized representative(s).

This Consortium Agreement shall have effect from the Effective Date identified at the beginning of this Consortium Agreement.

A new entity becomes a Party to the Consortium Agreement upon signature of the accession document (Attachment 2) by the duly authorized representative(s) of the new Party and the Coordinator. Such accession shall have effect from the date identified in the accession document.

Except for the Coordinator, who shall sign the Grant Agreement, the other Parties must accede to the Grant Agreement by signing the accession form to the Grant Agreement in the electronic exchange system within 30 days after its entry into force. Notwithstanding the above, they will assume the rights and obligations under the Grant Agreement with effect from the date of its entry into force.

In accordance with the provision of the Grant Agreement, if a Party does not accede to the Grant Agreement within the above deadline, the Coordinator shall, within 30 days, request an amendment to make any changes necessary to ensure proper implementation of the Action. The provisions of Article 3.2 and following shall apply. This event does not affect the Funding Authority’s right to terminate the Grant Agreement.

For any new entity acceding to the Grant Agreement, such new party must assume the rights and obligations under the Grant Agreement with effect from the date of its accession, specified in the accession form to the Grant Agreement.

### **3.2 Duration and termination**

This Consortium Agreement shall continue in full force and effect until complete fulfilment of all obligations undertaken by the Parties under the Grant Agreement and under this Consortium Agreement.

However, this Consortium Agreement or the participation of one or more Parties to it may be terminated in accordance with the terms of this Consortium Agreement.

If

- the Grant Agreement is not finally signed by the Funding Authority or,
- the Grant Agreement is not signed by a Party within a maximum period of 30 days, or

- the Grant Agreement is terminated, or
- a Party's participation in the Grant Agreement is terminated,

this Consortium Agreement shall automatically terminate in respect of the affected Party/ies, subject to the provisions surviving the expiration or termination under Section 3.3 of this Consortium Agreement.

### **3.3 Survival of rights and obligations**

The provisions relating to Access Rights, Dissemination and confidentiality, for the time period mentioned therein, as well as for liability, applicable law and settlement of disputes shall survive the expiration or termination of this Consortium Agreement.

Termination shall not affect any rights or obligations of a Party leaving the Consortium incurred prior to the date of termination, unless otherwise agreed between the CoP and the leaving Party. This includes the obligation to provide all input, Deliverables and documents for the period of its participation.

### **3.4 Effects of the termination**

The WPs of a leaving Party shall be assigned to one or several Parties or to one or several new entities, after discussion and decision by the CoP. The preference shall be granted to one or more of the original Parties. Any new Party to the Consortium shall agree to be bound by the terms of the Grant Agreement and by the terms of this Consortium Agreement. For the sake of clarity, the Grant Agreement and the Consortium Agreement shall be amended accordingly to reflect the new work-sharing and the corresponding funds.

## **4 Section: Responsibilities of Parties**

### **4.1 General principles**

Each Party, undertakes to efficiently implement the Project, and to cooperate, perform and fulfil, promptly and on time, all of its obligations under the Grant Agreement and this Consortium Agreement, as may be reasonably required from it and in a manner of good faith, as prescribed by Belgian Law. Each Party shall:

- Act at all times in good faith and in a manner that reflects the good name, goodwill and reputation of the other Parties and in accordance with good business ethics.
- Promptly notify the Coordinator, in accordance with the governance structure of the Project, any significant information, fact, problem or delay likely to affect the Project.
- Promptly provide all information reasonably required by the relevant Consortium Body or by the Coordinator to carry out its tasks. The work activities, Deliverables and timeline in the framework of the Project are described in the Attachments and the Annexes of the Grant Agreement.
- Take reasonable measures to ensure the accuracy of any information or materials it supplies to the other Parties under the Consortium Agreement and to the Funding Authority under the Grant Agreement and promptly correct any error therein of which it is notified.
- Warrant that the Deliverables comply with the needs of the Project as per the Consortium Plan.

- Not use any proprietary rights for which such Party has not acquired the corresponding rights.
- Allow the Funding Authority and the European authorities to perform the checks, reviews, audits and investigations referred to in the Grant Agreement.
- Take all measures to prevent any situation where the impartial and objective implementation of the action is compromised for reasons involving economic interest, political or national affinity, family or emotional ties or any other shared interest, in accordance with the provisions of the Grant Agreement. Each Party must formally notify to the Coordinator and the Funding Authority, without delay, any situation constituting or likely to lead to a conflict of interests and immediately take all the necessary steps to rectify this situation. The Funding Authority may verify that the measures taken are appropriate and may require additional measures to be taken by a specified deadline.
- Keep records and other supporting documentation in order to prove the proper implementation of the Project and the costs they declare as eligible, in accordance with the provisions of the Grant Agreement.

## **4.2 Breach**

In the event that a responsible Consortium Body identifies a breach by a Party of its obligations under this Consortium Agreement or the Grant Agreement (e.g.: improper implementation of the Project), the Coordinator or, if the Coordinator is in breach of its obligations, the Party appointed by the CoP, will give formal notice to such Party requiring that such breach will be remedied within 30 calendar days from the date of receipt of the written notice by the Party or within any other period requested by the CoP, bearing in mind the specific circumstances (e.g.: if the Grant Agreement and/or the Funding Authority request a shorter period).

If such breach is substantial and is not remedied within the aforesaid period or if such substantial breach cannot be remedied, the CoP shall resolve and may declare the Party to be a Defaulting Party and to decide on the consequences thereof, which may include the termination of its participation in the Project and the reallocation of the corresponding tasks, as part of the updated Consortium Plan or any other agreed solution.

For the sake of clarity, the breaches identified under the Grant Agreement as entailing the Funding Authority to terminate the participation of the affected Party shall be considered as substantial.

If such breach is not substantial and is not remedied within that period or if such non substantial breach cannot be remedied, the CoP shall address the issue by reallocation of tasks as part of the next Consortium Plan or by finding other solutions.

## **4.3 Involvement of third parties**

A Party that enters into a subcontract or otherwise involves third parties in the Project (including but not limited to Affiliates) remains responsible for carrying out its relevant part of the Project and for such third party's compliance with the provisions of this Consortium Agreement and of the Grant Agreement. Such Party has to ensure that the involvement of third parties does not affect the rights and obligations of the other Parties under this Consortium Agreement and the Grant Agreement.



Subcontracting shall cover only a limited part of the Project. The Parties must award the subcontracts ensuring the best value for money or, if appropriate, the lowest price. In doing so, the Parties must avoid any conflict of interests.

The Parties must ensure that the bodies mentioned in the Grant Agreement (e.g. Funding Authority, OLAF, Court of Auditors (ECA), etc.) can exercise their rights also towards the Subcontractors.

The Parties must ensure that their obligations under Articles 35, 36, 38 and 46 of the Grant Agreement also apply to the Subcontractors.

An initial list of Subcontractors, if any, is provided for information purposes under Attachment 5, including the tasks to be implemented and the estimated cost for each Subcontract and the total estimated costs of subcontracting. Any Party shall be entitled to update the Attachment 5 with the prior written notice to the Coordinator and the other Parties and without the need to formalize an amendment to this Agreement. For the sake of clarity, the provisions of this Section 4.3 and Article 13 of the Grant Agreement shall be fulfilled.

If a Party breaches any of its obligations under this Section, the costs related to the subcontract concerned will be ineligible and will be rejected and shall be assumed by the relevant Party.

Such breaches may also lead to any of the other measures described in Sections 3 and 5, including *inter alia* the reduction of the grant.

## **5 Section: Liabilities towards each other**

### **5.1 Warranties**

In respect of any information or materials (incl. Results and Background) supplied by one Party to another under the Project, no warranty or representation of any kind is made, given or implied as to the sufficiency or fitness for purpose nor as to the absence of any infringement of any proprietary rights of third parties.

Therefore,

- the recipient Party shall in all cases be entirely and solely liable for the use to which it puts such information and materials, and
- no Party granting Access Rights shall be liable in case of infringement of proprietary rights of a third party resulting from any other Party (or its Affiliates) exercising its Access Rights.

For the sake of clarity, the provisions of Article 25 of the Agreement shall remain fully applicable.

## **5.2 Limitation of contractual liability**

No Party shall be responsible to any other Party for any indirect or consequential loss or similar damage, such as, but not limited to, loss of profit, loss of revenue or loss of contracts, provided such damage was not caused by a wilful act or gross negligence or by a breach of confidentiality.

For any remaining contractual liability, a Party's aggregate liability towards the other Parties collectively shall be limited to once the Party's share of the total costs of the Project as identified in Annex 2 of the Grant Agreement, provided such damage was not caused by a wilful act or gross negligence.

The terms of this Consortium Agreement shall not be construed to amend or limit any Party's statutory liability.

## **5.3 Damage caused to third parties**

Each Party shall be solely liable for any loss, damage or injury to third parties resulting from the performance of the said Party's obligations by it or on its behalf under this Consortium Agreement or from its use of Results or Background.

The Party involved in such third party claim shall conduct all negotiations for a settlement and any litigation that might be ensued. The other Parties shall not make any prejudicial statement.

## **5.4 Force Majeure**

### **5.4.1.**

No Party shall be considered to be in breach of this Consortium Agreement if it is prevented from fulfilling its obligations under the Consortium Agreement by Force Majeure.

The affected Party shall formally notify the competent Consortium Body and the Coordinator of any Force Majeure without undue delay, stating the nature, likely duration and foreseeable effects, in order to permit the Coordinator to notify the Funding Authority, if so necessary.

The Parties must immediately take all the necessary measures to limit any damage due to Force Majeure and do their best to resume implementation of the action as soon as possible. If the consequences of Force Majeure are not overcome within 6 weeks after such notification, the remedies to be implemented, including the transfer of Tasks - if any - shall be decided by the CoP and notified to the Funding Authority for its approval, if necessary.

### **5.4.2**

For any delayed delivery directly or indirectly caused by the outbreak of epidemics or action taken by the government or public authority with regard to epidemic, the affected Party shall be exempt from liability, if so agreed by the Funding Authority in accordance with the Grant Agreement. In any event, the affected Party undertakes, as far as possible, to limit any potential delay in the Project.

## 6 Section: Governance structure/Consortium Bodies/Project Roles

### 6.1 General structure

Each Party has a clearly defined technical, validation and management role.

The Project is structured by **WP** which are broken down in Tasks. The WP breakdown structure is presented in Annex 1 of the Grant Agreement.

The management, coordination and decisions of the Project are handled by the Consortium Bodies, organized as follows:

- **CoP** as the highest level of authority body and ultimate decision-making body of the Consortium.
- **PST** will focus on Consortium management issues, including Quality Assurance (QA), Consortium roles and responsibilities, audit certificates, ethics, gender issues, societal questions and liaison with third parties and the EU bodies.
- **Coordinator** is the legal entity acting as the intermediary between the Parties and the Funding Authority. The Coordinator shall, in addition to its responsibilities as a Party, perform the tasks assigned to it as described in the Grant Agreement and in this Consortium Agreement.

All of them supported by the following boards and panel, specified in Annex 1 of the Grant Agreement:

- **External Advisory Board (EAB):** The EAB will offer impartial scientific advice, support the PST and advise the Consortium on social, environmental, technological, legal and economic factors that may influence the innovation management of the Project. It will be chaired by one of its members, elected upon the EAB's first meeting. All of them comprises the structure of external advisors representing research and business interests.  
The EAB will meet at the start of the Project and then at least yearly to review the Project achievements. EAB members may be invited by the CoP when their mandates, objectives and activities fall in line with the objectives of the Project.
- **Ethics Panel:** Chaired by the Ethics Manager and may include the legal advisors of the Parties involved in each sensitive task (i.e. experts on ethics, privacy, and legal issues such as the data protection officers of the involved partners). An external expert will be invited to the panel, to act as an independent reviewer to ensure decisions taken are fair, transparent, neutral, generalised, adoptable by wider audiences and aligned with the Project's ethical framework.
- **Innovation & Commercialization Board (I&CB):** The I&CB, chaired by the Innovation & IPR Manager, includes a member from each organization participating in the PST. Its role is to detail the commercialization strategy.

The Parties shall attend the required meetings (Consortium Bodies meetings or Work Packages meetings).

## 6.2 General operational procedures for all Consortium Bodies

### 6.2.1 Representation in meetings

Any member of a Consortium Body (hereinafter referred to as "Member"):

- should be present or represented at any meeting;
- may appoint a substitute or a proxy to attend and vote at any meeting; and
- shall participate in a cooperative manner in the meetings.

### 6.2.2 Preparation and organization of meetings

#### 6.2.2.1 Convening meetings

The chairperson of a Consortium Body shall convene meetings of that Consortium Body.

Consortium Body	Ordinary meeting	Extraordinary meeting
CoP	At least once a year	At any time upon: <ul style="list-style-type: none"> <li>- Written request of 1/3 of its Members or</li> <li>- Written request of any of its Members related to any significant issue relevant to the management role of this Consortium Body</li> <li>- Upon request of the Coordinator</li> </ul>
PST	At least once every 4 months (three times a year)	At any time upon written request of any of its Members (including the Coordinator).

#### 6.2.2.2 Notice of a meeting

The chairperson of a Consortium Body shall give notice in writing (by email) of a meeting to each Member of that Consortium Body as soon as possible and no later than the minimum number of days preceding the meeting as below indicated.

Consortium Body	Ordinary meeting	Extraordinary meeting
CoP	30 calendar days	15 calendar days
PST	14 calendar days	7 calendar days

#### 6.2.2.3 Sending the agenda

The chairperson of a Consortium Body shall prepare and send (by email) to each Member of that Consortium Body the agenda no later than the minimum number of days preceding the meeting as below indicated.

Consortium Body	Ordinary meeting	Extraordinary meeting
CoP	21 calendar days	10 calendar days
PST	10 calendar days	7 calendar days

**6.2.2.4 Adding agenda items:**

Any agenda item requiring a decision by the Members of a Consortium Body must be identified as such on the agenda.

Any Member of a Consortium Body may add an item to the original agenda by email to all of the other Members of that Consortium Body up to the minimum number of days preceding the meeting as below indicated. The items to be included must contain a short description and topics to be discussed.

Consortium Body	Ordinary meeting	Extraordinary meeting
CoP	14 calendar days	7 calendar days
PST	7 calendar days	5 calendar days

**6.2.2.5**

During a meeting the Members of a Consortium Body, present or represented, can unanimously agree to add a new item to the original agenda.

**6.2.2.6**

Meetings of each Consortium Body may also be held by teleconference or other telecommunication means.

**6.2.2.7**

Decisions will only be binding once the relevant part of the Minutes has been accepted according to Section 6.2.4

**6.2.2.8**

Any decision may also be taken without a meeting if the Coordinator circulates, by email, to all Members of the Consortium Body a written document, which is then agreed by the defined majority (see Section 6.2.3) of all Members of the Consortium Body. Such document shall include the deadline for responses.

Decisions taken without a meeting shall be considered as accepted if, within the period set out in section 6.2.4, no Member has sent an objection in writing to the chairperson. The decisions will be binding after the chairperson sends to all Members of the Consortium Body and to the Coordinator a written notification of this acceptance.

**6.2.3 Voting rules and quorum. Veto rights**

Each Consortium Body shall deliberate and decide validly if at least two thirds (2/3) of the Members are present or represented (quorum). If the quorum is not reached, the chairperson of the Consortium Body shall convene an extraordinary meeting, which shall be entitled to decide, even if less than the quorum of Members is present or represented.

Each Party of a Consortium Body present or represented in the meeting shall have one vote and decisions shall be taken by a majority of at least two-thirds (2/3) of the votes. In each Consortium Body, the chairman will hold a casting vote.

A Party which the CoP has declared, according to Section 4.2. to be a Defaulting Party shall not vote.

A Member which can show that its entity's own work, time for performance, costs, liabilities, intellectual property rights or other legitimate interests would be severely affected by a decision of a Consortium Body may exercise a veto with respect to the corresponding decision or relevant part of the decision.

When the decision is foreseen on the original agenda, a Member may veto such a decision during the meeting only.

When a decision has been taken on a new item added to the agenda before or during the meeting, a Member may veto such decision during the meeting or within fifteen (15) calendar days after the draft minutes of the meeting are sent. A Party that is not a Member of a particular Consortium Body may veto a decision within the same number of calendar days after the draft minutes of the meeting are sent. When a decision has been taken without a meeting, a Member may veto such decision within fifteen (15) calendar days after written notification by the chairperson of the outcome of the vote.

In case of exercise of veto, the Members of the related Consortium Body shall make every effort to resolve the matter which occasioned the veto to the general satisfaction of all its Members. A Party may neither veto decisions relating to its identification to be in breach of its obligations nor to its identification as a Defaulting Party. The Defaulting Party may not veto decisions relating to its participation and termination in the consortium or the consequences of them. Additionally, a Party requesting to leave the consortium may not veto decisions relating thereto.

#### **6.2.4 Minutes of meetings**

The chairperson of a Consortium Body shall produce written minutes of each meeting which shall be the formal record of all decisions taken. The chairperson shall send the drafted minutes to all Members within ten (10) calendar days of the meeting.

The minutes shall be considered as accepted if, within fifteen (15) calendar days from sending, no Member has sent an objection in writing to the chairperson with respect to the accuracy of the draft of the minutes. If there is any objection, the Members shall discuss and agree any potential amendment within a period of ten (10) calendar days.

The chairperson shall send the accepted/consolidated minutes to all the Members of the Consortium Body and to the Coordinator, who shall safeguard them.

### **6.3 Specific operational procedures for the Consortium Bodies**

#### **6.3.1 CoP**

In addition to the rules described in Section 6.2, the following rules apply:

The CoP is the ultimate decision making body of the Consortium. It shall be the responsible for the overall coordination of the Consortium and major decisions with regard to the Project and for ensuring that the Project meets the requirements and goals as described within the Grant Agreement.

The CoP is the only formal forum empowered to take decisions regarding the Consortium Agreement and Grant Agreement. For the sake of clarification, the CoP has no competence to take decisions concerning the internal sovereignty and independence of the Parties.

The CoP shall appoint during the kickoff meeting of the Project the EAB, Ethics Panel and I&CB members and chairs.

#### **6.3.1.1 Members and chairperson**

The CoP shall consist of one management representative of each Party. The CoP appointed Members shall be notified to the Coordinator by each Party within five (5) calendar days from the signature of the Consortium Agreement, together with the associated contact information. Any change will have to be notified in writing by the concerned Party to the Coordinator without delay and, in any event, at least fifteen (15) calendar days in advance.

Each CoP Member shall be deemed to be duly authorized to deliberate, negotiate and decide on all matters listed in Section 6.3.1.2. for the whole term of this Consortium Agreement.

The Coordinator shall call and chair all meetings of the CoP, unless otherwise specifically decided in any meeting of the CoP.

#### **6.3.1.2 Decisions**

The CoP shall be free to act on its own initiative to formulate proposals and take decisions in accordance with the procedures set out herein. In addition, all proposals made by or through the Coordinator shall also be considered and decided upon by the CoP.

The meeting agenda will include but not be limited to: (a) report by the PC, (b) report by the Quality Assurance & Risks Manager on quality and risks issues, (c) reports by WP Leaders on technical implementation issues, (d) approval of annual and final reports, (e) approval of yearly implementation plans, and (f) decisions on specific items. The CoP has the following chairs: Project Coordinator, Technical Coordinator, Quality and Risk Manager, Communication Manager, Demonstration Manager, Ethics and Legal Coordination, Cross-sectorial Cooperation Manager, and Standardization Manager.

The following decisions shall be taken by the CoP:

##### **a. Work Packages and project management:**

- Deciding upon major changes in WP, such as termination, creation or reallocation of the activities and any amendment to the content of the work to be executed. For the sake of clarity, major changes in WP shall be considered as any amendment that would require to reach an agreement with the Funding Authority and the amendment of the Grant Agreement;
- Deciding any substantial reduction or increase of any Party's work share. For the sake of clarity, substantial shall be considered as any amendment to the content of the Annex 2 to

the Grant Agreement that would require to reach an agreement with the Funding Authority and the amendment of the Grant Agreement;

- Take responsibility for all aspects of the management of the Project, including the review of the progress against the defined deliverables and timetables and propose corrective actions whenever necessary;
- Take decisions about Force Majeure in accordance with Section 5.4.

b. Evolution of the Consortium:

- Approving possible amendments to the Grant Agreement and/or the Consortium Agreement.
- Entry of a new Party to the Consortium and approval of the settlement on the conditions of the accession of such a new Party including the Grant Agreement and the Consortium Agreement, of such new entity;
- Identification of a breach by a Party of its obligations under this Consortium Agreement and/or the Grant Agreement;
- Withdrawal of a Party from the Consortium and the approval of the settlement on the conditions of the withdrawal;
- Declaration of a Party to be a Defaulting Party;
- Remedies and actions to be taken against a Defaulting Party;
- Termination of a Defaulting Party's participation in the Consortium and measures relating thereto;
- Approving the request of the Funding Authority to terminate the participation of a defaulting Party, the request to suspend all or part of the Project or the request to terminate all or part of the Project;
- Proposing and, if agreed, to submit to the Funding Authority, a proposal for a change of Coordinator, in the event that Coordinator has been declared as defaulting Party Project.

c. Intellectual Property Rights:

- Agreeing general procedures and applicable policies in accordance with the rules of the Grant Agreement, for knowledge and IPR management. For the sake of clarity, specific topics related to Intellectual Property Rights not affecting to the general procedures and policies shall be addressed in the respective WP.

The Parties agree to abide by all decisions of the CoP. This commitment does not prevent the Parties to submit a dispute to resolution in accordance with the provisions of Settlement of disputes in Section 11.8.

### **6.3.2 PST**

In addition to the rules in Section 6.2, the following rules shall apply:



### 6.3.2.1 Members

The PST consists of the managers of the project, who bring a wealth of experience in coordinating EU projects. The PST ensures that the Project will achieve its objectives and satisfy the needs of the Funding Authority, the Consortium and VALKYRIES industries.

- Project Coordinator (PC): Ensure efficient communication between partners and with the EU and mediate any conflict as necessary. As chair of the CoP and PST, be responsible for the integrative, cross-disciplinary issues of the project, for planning and monitoring progress and implement any necessary corrective measures. Ensure final reports submitted to the EU are complete and accurate. In the event of a WP giving an unexpected result, flag the issue to the CoP, which will determine the appropriate course of action. Endeavor to maintain team motivation, encourage creativity among the project team, and ensure that corrective actions are taken as necessary. The PC will follow up the project status and continuously check progress against schedule and budget, if milestones are met and deliverables adequately produced. It will also submit deliverables, produce agenda, minutes for the PST and CoP meetings; ultimately, it will manage the information flows between partners and organise resolution procedures.
- Technical Manager (TM): The TM will guide and monitor the technical progress of the project. TM will conduct a technical assessment of completed and running activities as well as drafting reports to CoP. In strong collaboration with IM and the EAB, the TM aligns technical direction with innovation strategies and establishes and maintains the Project's design specifications and platform. TM also monitors the preparation of technical deliverables and identifies trends and technologies.
- Quality Assurance & Risks Manager (QRM): Develops and supervises quality plan, risk assessment and implementation of mitigation measures, ensures high-quality deliverables and thoroughly tested and reliable solutions. QRM also chairs quality reviews. The PST's member reports to CoP Performs project quality checks, risk assessment and monitoring. QRM performs QA project reviews, evaluation measurements and produces quality reports. Supervises implementation of the quality plan; organises and supervises quality review/peer reviews for all deliverables; signs all deliverables; alerts CoP to any quality issues.
- Dissemination & Communication Manager (D&CM): Leads the dissemination and communication (D&C) activities and is also Responsible for defining the D&C strategy and coordinating the D&C activities.
- Ethics Manager (EthM): Leads the project's ethics and monitors the objectives and implications of the Project, to ensure that it conforms to the highest ethical standards. The PST's member reports to the CoP. The EthM will guide partners in their work and provide input regarding ethics in all activities involving research with humans, dealing with the Ethical Panel members and involving the needed experts for each task.
- Innovation & IPR Manager (IM): The IM is a PST Member and reports to the CoP, advises the partners on the scope and potential of the innovations arising from the Project and identifies IP at regular checkpoints. The IM identifies trends and technologies that could be of interest to the project and is responsible for the creation of the Innovation progress reports for the EAB and the I&CB. The IM will be responsible of promoting the adoption of the Project' outcomes by end-users; identifying

potential stakeholders and designing the overall go-to-market strategy and commercialization actions. In strong collaboration with the EAB and I&CB, the IM is responsible for all activities towards market take-up, including showcases and the Project's branding. The IM also checks business/exploitation objectives progress and performs business risk management. The IM leads the market assessment, feasibility study, revenue planning, business model and roadmap.

- Demonstrations Coordinator (DM): Responsible of the management of the UCs, including the coordination between them and between the different partners from different countries. The DM will ensure that the preparation, planification, execution, results and post analysis covering all the requirements and the expected conclusions, conducts to an improvement over the current processes on a disaster response.

- Cross-Sectorial Cooperation Manager (CsCM): Responsible for guaranteeing the transfer and coordination between military and civil elements of the proposal. To do that (BDI) will guide the proper implementation of the project Consultation Strategy and Communication plans concerning the engagement and collaboration between the Project, first-aid responders, Civilian Protection, volunteering platforms military institutions and other stakeholders (industry, RTOs, etc.).

- Standardization Manager (SM): Responsible for elaborating and coordinate the standardization process in the proposal. SM will guide all the standardization processes, including the features of the standard, starting conditions, possible interfaces with other standards, activities to be done within the standard and execution paths. The SM will inform of the proposed standards and how to join them.

- WPLs: The leader of a given WP from WP1 to WP7 reports to the PM and produces detailed work plans and progress reports, also safeguarding the timely and effective execution of the WP work and that deliverables meet the quality standards. It will also review the results of the WP, point out any underperformance and provide information for management reports in the PST.

Each WPL shall be fully responsible for the technical management, monitoring, reporting and coordination of the activities in relation with the performance of the WP. The WPL shall act as the contact point for the PC and shall liaise with other WPLs, is so necessary, participating in any meeting required by the Coordinator and/or the Funding Authority.

The managers are designed in Annex 1 of the Grant Agreement. Except for the Project Coordinator and the Technical Manager, who may be changed at any time by the Coordinator, the change of any of the other managers shall be discussed and agreed within the CoP.

#### **6.3.2.2 Tasks**

The PST ensures that the Project will achieve its objectives and satisfy the needs of the Funding Authority, the Consortium and VALKYRIES industries, monitoring the effective and efficient implementation of the Project.

The PST shall be responsible for the proper execution and implementation of the decisions of the CoP.

In addition, the PST shall collect information at least every six (6) months on the progress of the Project, examine that information to assess the compliance of the Project with the Consortium Plan and, if necessary, propose modifications of the Consortium Plan to the CoP.

The PST shall:

- support the Coordinator in preparing meetings with the Funding Authority and in preparing related data and deliverables;
- prepare the content and timing of press releases and joint publications by the consortium proposed by the Funding Authority respect of the procedures of Article 29 of the Grant Agreement.

In the case of abolished tasks as a result of a decision of the CoP, the PST shall advise the CoP on ways to rearrange tasks and budgets of the Parties concerned. Such rearrangement shall take into consideration the legitimate commitments taken prior to the decisions, which cannot be cancelled.

### **6.3.3 Coordinator:**

#### **6.3.3.1**

The Coordinator shall be the legal entity acting as the intermediary between the Parties and the Funding Authority and is in charge of the interaction with the Funding Authority, including the management of the Deliverables and their submission to the Funding Authority.

The Coordinator shall, in addition to its responsibilities as a Party, perform the tasks assigned to it as described in the Grant Agreement and this Consortium Agreement.

Moreover, the Coordinator will distribute between the Parties the Project documents, reports and meeting minutes, as well as any other information received or other relevant information.

#### **6.3.3.2 Tasks**

In particular, the Coordinator shall be in charge of:

- monitoring compliance by the Parties with their obligations, including monitoring of progress (results, milestones and Deliverables) of the Project, to be in compliance with the Grant Agreement.
- the supervision, coordination and integration between Work Packages;
- keeping the address list of Parties and contact data updated and available;
- collecting, reviewing and submitting information on the progress of the Project and reports and other deliverables (including financial statements and related certification) and specific requested documents to the Funding Authority;
- the organization and preparation of coordination meetings, preparing the meetings, proposing decisions and preparing the agenda of CoP and PST meetings, chairing the meetings of the CoP and PST, preparing the minutes of the meetings and monitoring the implementation of decisions taken at meetings;
- transmitting documents and information connected with the Project to the Parties;
- the cost monitoring and reporting; using the data provided by the Parties;
- administering the financial contribution of the Funding Authority and fulfilling the financial tasks described in Section 7.3;
- distributing the payments received from the Funding Authority to the other Parties and inform the Funding Authority about the payments made to the other Parties;

- providing, upon request, the Parties with official copies or originals of documents which are in the sole possession of the Coordinator when such copies or originals are necessary for the Parties to present claims;
- receiving and submitting requests for amendments and termination at the initiative of the Consortium in accordance with the decisions of the CoP.

The Coordinator shall not be entitled to act or to make legally binding declarations on behalf of any other Party. The Coordinator shall not enlarge its role beyond the tasks specified in this Consortium Agreement and in the Grant Agreement.

The level of details regarding information requested by the Coordinator for the management of the Project and the frequency for providing such information beyond the reporting periods set in the Grant Agreement and this Consortium Agreement shall be prior agreed by the CoP.

If the Coordinator fails in its coordination tasks, the CoP may propose to the Funding Authority to change the Coordinator.

If one or more of the Parties is late in submission of any Project deliverable, the Coordinator may nevertheless submit the other parties' Project deliverables and all other documents required by the Grant Agreement to the Funding Authority in time.

## **7 Section: Financial provisions**

### **7.1 General Principles**

#### **7.1.1 Distribution of Financial Contribution**

The financial contribution of the Funding Authority to the Project shall be distributed by the Coordinator according to:

- the Consortium Plan,
- the approval of reports by the Funding Authority, in accordance with the provisions of the Grant Agreement, and
- the provisions of payment in Section 7.3.

A Party shall be funded only for its Tasks carried out in accordance with the Consortium Plan.

#### **7.1.2 Justifying Costs**

In accordance with its own usual accounting and management principles and practices, each Party shall be solely responsible for justifying its costs with respect to the Project towards the Funding Authority.

Neither the Coordinator nor any of the other Parties shall be in any way liable or responsible for such justification of costs towards the Funding Authority.

### **7.1.3 Funding Principles**

A Party that spends less than its allocated share of the budget as set out in the Consortium Plan or – in case of reimbursement via unit costs - implements less units than foreseen in the Consortium Plan will be funded in accordance with its actual duly justified eligible costs only.

A Party that spends more than its allocated share of the budget will be funded only in respect of duly justified eligible costs up to an amount not exceeding that share.

### **7.1.4 Return of excess payments (recoveries); receipts**

In any case of a Party having received excess payments, the Party has to return the relevant amount to the Coordinator without undue delay. If a Party fails or refuse to return this amount, the CoP may decide to declare the Party to be a Defaulting Party and to decide on the consequences thereof. For the sake of clarity, such declaration is independent of any action to be taken by the Funding Authority under the Grant Agreement.

In case a Party earns any receipt that is deductible from the total funding as set out in the Consortium Plan, the deduction is only directed toward the Party earning such income. The other Parties' financial share of the budget shall not be affected by one Party's receipt. In case the relevant receipt is more than the allocated share of the Party as set out in the Consortium Plan, the Party shall reimburse the funding reduction suffered by other Parties.

### **7.1.5 Financial Consequences of the termination of the participation of a Party**

A Party leaving the Consortium shall refund all payments it has received except the amount of contribution accepted by the Funding Authority. Furthermore a Defaulting Party shall, within the limits specified in Section 5.2 of this Consortium Agreement, bear any reasonable and justifiable additional costs incurred by the other Parties in order to perform its Tasks. Moreover, the remaining provisions of Section 5 and the Grant Agreement in relation with the liability of the Defaulting Party shall apply.

## **7.2 Budgeting**

The budget set out in the Consortium Plan shall be valued in accordance with the usual accounting and management principles and practices of the respective Parties.

## **7.3 Payments**

### **7.3.1 Payments to Parties are the exclusive tasks of the Coordinator.**

In particular, the Coordinator shall:

- notify the concerned Party promptly of the date and composition of the amount transferred to its bank account, giving the relevant references,
- perform diligently its tasks in the proper administration of any funds and in maintaining financial accounts,
- undertake to keep the Funding Authority's financial contribution to the Project separated from its normal business accounts, its own assets and property.

With reference to Articles 21.2 and 21.3.2 of the Grant Agreement, no Party shall before the end of the Project receive more than its allocated share of the maximum grant amount from which the amounts retained by the Funding Authority for the Guarantee Fund and for the final payment have been deducted.

### **7.3.2**

The payment schedule, which contains the transfer of pre-financing payments and final payment to Parties, will be handled according to the following:

- Funding of costs included in the Grant Agreement will be paid to Parties after receipt from the Funding Authority without undue delay and in conformity with the provisions of the Grant Agreement. Costs accepted by the Funding Authority will be paid to the concerned Party.

The Coordinator is entitled to withhold any payments due to a Party identified by a responsible Consortium Body to be in breach of its obligations under this Consortium Agreement and/or the Grant Agreement.

The Coordinator is entitled to recover any payments already paid to a Defaulting Party. The Coordinator is equally entitled to withhold payments to a Party when this is suggested by or agreed with the Funding Authority.

### **7.3.3**

Payments shall be done by the Coordinator to the bank account identified by each Party within five (5) working days from the signature of the Consortium Agreement in accordance with the model provided in Attachment 6. Any change to the bank account information shall be promptly notified to the Contractor. The Parties hereby acknowledge that any change not notified on time may lead to delays in the transfer of the relevant amount by the Coordinator. Payments to the relevant Party shall be done by the Coordinator to the bank account of each Party, within a period of thirty (30) working days from receipt of the corresponding funds from the Funding Authority, as long as the relevant Party has fulfilled all the formal steps, except from the pre-financing which should be paid to the relevant Party within a period of five (5) working days from receipt of the corresponding funds from the Funding Authority.

## **8 Section: Results**

### **8.1 Ownership of Results**

Results are owned by the Party that generate them.

### **8.2 Joint ownership**

Joint ownership is governed by Article 26.2 of the Grant Agreement with the following additions:

Unless otherwise agreed: - each of the joint owners shall be entitled to use their jointly owned Results for non-commercial research activities on a royalty-free basis, and without requiring the prior consent of the other joint owner(s), and - each of the joint owners shall be entitled to otherwise Exploit the jointly owned. Results and to grant non-exclusive licenses to third parties(without any right to sub-license), if the other joint owners are given: (a) at least 45 calendar days advance notice; and (b) Fair and Reasonable compensation.

### **8.3 Transfer of Results**

8.3.1 Each Party may transfer ownership of its own Results following the procedures of Article 30 of the Grant Agreement.

8.3.2 It may identify specific third parties it intends to transfer the ownership of its Results to in Attachment 4 to this Consortium Agreement. The other Parties hereby waive their right to prior notice and their right to object to a transfer to listed third parties according to the Article 30.1 of the Grant Agreement.

8.3.3 The transferring Party shall, however, at the time of the transfer, inform the other Parties of such transfer and shall ensure that the rights of the other Parties will not be affected by such transfer.

Any addition to Attachment 4 after signature of this Agreement requires a decision of the CoP.

8.3.4 The Parties recognize that in the framework of a merger or an acquisition of an important part of its assets, it may be impossible under applicable EU and national laws on mergers and acquisitions for a Party to give the full 45 calendar days prior notice for the transfer as foreseen in the Grant Agreement.

8.3.5 The obligations above apply only for as long as other Parties still have - or still may request - Access Rights to the Results.

### **8.4 Dissemination**

8.4.1. For the avoidance of doubt, nothing in this Section 8.4 has impact on the confidentiality obligations set out in Section 10.

#### **8.4.2 Dissemination of own Results**

8.4.2.1 During the Project and for a period of 1 year after the end of the Project, the dissemination of own Results by one or several Parties including but not restricted to publications and presentations, shall be governed by the procedure of Article 29.1 of the Grant Agreement, subject to the following provisions.

Prior notice of any planned publication shall be given to the other Parties at least 30 calendar days before the publication. Any objection to the planned publication shall be made in accordance with the Grant Agreement in writing to the Coordinator and to the Party or

Parties proposing the dissemination within 15 calendar days after receipt of the notice. If no objection is made within the time limit stated above, the publication is permitted.

#### 8.4.2.2 An objection is justified if

- (a) the protection of the objecting Party's Results or Background would be adversely affected
- (b) the objecting Party's legitimate interests in relation to the Results or Background would be significantly harmed.

The objection has to include a precise request for necessary modifications.

8.4.2.3 If an objection has been raised the involved Parties shall discuss how to overcome the justified grounds for the objection on a timely basis (for example by amendment to the planned publication and/or by protecting information before publication) and the objecting Party shall not unreasonably continue the opposition if appropriate measures are taken following the discussion.

The objecting Party can request a publication delay of not more than 90 calendar days from the time it raises such an objection. After 90 calendar days, the publication is permitted.

#### 8.4.3 Dissemination of another Party's unpublished Results or Background

A Party shall not include in any dissemination activity another Party's Results or Background without obtaining the owning Party's prior written approval, unless they are already published.

#### 8.4.4 Cooperation obligations

The Parties undertake to cooperate to allow the timely submission, examination, publication and defence of any dissertation or thesis for a degree that includes their Results or Background subject to the confidentiality and publication provisions agreed in this Consortium Agreement.

#### 8.4.5 Use of names, logos or trademarks

Nothing in this Consortium Agreement shall be construed as conferring rights to use in advertising, publicity or otherwise the name of the Parties or any of their logos or trademarks without their prior written approval.

## 9 Section: Access Rights

### 9.1 Background included

9.1.1 In Attachment 1, the Parties have identified and agreed on the Background for the Project and have also, where relevant, informed each other that Access to specific Background is subject to legal restrictions or limits.

Anything not identified in Attachment 1 shall not be the object of Access Right obligations regarding Background.



9.1.2 Any Party may add further Background to Attachment 1 during the Project by written notice to the other Parties. However, approval of the CoP is needed should a Party wish to modify or withdraw its Background in Attachment 1.

## **9.2 General Principles**

9.2.1 Each Party shall implement its tasks in accordance with the Consortium Plan and shall bear sole responsibility for ensuring that its acts within the Project do not knowingly infringe third party property rights.

9.2.2 Any Access Rights granted expressly exclude any rights to sublicense unless expressly stated otherwise.

9.2.3 Access Rights shall be free of any administrative transfer costs.

9.2.4 Access Rights are granted on a non-exclusive basis.

9.2.5 Results and Background shall be used only for the purposes for which Access Rights to it have been granted.

9.2.6 All requests for Access Rights shall be made in writing.

The granting of Access Rights may be made conditional on the acceptance of specific conditions aimed at ensuring that these rights will be used only for the intended purpose and that appropriate confidentiality obligations are in place.

9.2.7 The requesting Party must show that the Access Rights are Needed.

## **9.3 Access Rights for implementation**

Access Rights to Results and Background Needed for the performance of the own work of a Party under the Project shall be granted on a royalty-free basis, unless otherwise agreed for Background in Attachment 1.

## **9.4 Access Rights for Exploitation**

9.4.1 Access Rights to Results if Needed for Exploitation of a Party's own Results shall be granted on Fair and Reasonable conditions.

Access rights to Results for internal research activities shall be granted on a royalty-free basis.

9.4.2 Access Rights to Background if Needed for Exploitation of a Party's own Results, including for research on behalf of a third party, shall be granted on Fair and Reasonable conditions.

9.4.3 A request for Access Rights may be made up to twelve months after the end of the Project or, in the case of Section 9.7.2.1.2, after the termination of the requesting Party's participation in the Project.

## **9.5 Access Rights for Affiliates**

Affiliates have Access Rights under the conditions of the Grant Agreement Articles 25.4 and 31.4.

Such Access Rights must be requested by the Affiliate from the Party that holds the Background or Results. Alternatively, the Party granting the Access Rights may individually agree with the Party requesting the Access Rights to have the Access Rights include the right to sublicense to the latter's Affiliates. Access Rights to Affiliates shall be granted on Fair and Reasonable conditions and upon written bilateral agreement.

Affiliates which obtain Access Rights in return fulfil all confidentiality and other obligations accepted by the Parties under the Grant Agreement or this Consortium Agreement as if such Affiliates were Parties.

Access Rights may be refused to Affiliates if such granting is contrary to the legitimate interests of the Party

## **9.6 Additional Access Rights**

For the avoidance of doubt any grant of Access Rights not covered by the Grant Agreement or this Consortium Agreement shall be at the absolute discretion of the owning Party and subject to such terms and conditions as may be agreed between the owning and receiving Parties.

## **9.7 Access Rights for Parties entering or leaving the consortium**

### **9.7.1 New Parties entering the consortium**

As regards Results developed before the accession of the new Party, the new Party will be granted Access Rights on the conditions applying for Access Rights to Background.

### **9.7.2 Parties leaving the consortium**

#### **9.7.2.1 Access Rights granted to a leaving Party**

##### **9.7.2.1.1 Defaulting Party**

Access Rights granted to a Defaulting Party and such Party's right to request Access Rights shall cease immediately upon receipt by the Defaulting Party of the formal notice of the decision of the CoP to terminate its participation in the consortium.

#### 9.7.2.1.2 Non-defaulting Party

A non-defaulting Party leaving voluntarily and with the other Parties' consent shall have Access Rights to the Results developed until the date of the termination of its participation.

It may request Access Rights within the period of time specified in Section 9.4.3.

#### 9.7.2.2 Access Rights to be granted by any leaving Party

Any Party leaving the Project shall continue to grant Access Rights pursuant to the Grant Agreement and this Consortium Agreement as if it had remained a Party for the whole duration of the Project.

### 9.8 Specific Provisions for Access Rights to Software

For the avoidance of doubt, the general provisions for Access Rights provided for in this Section 9 are applicable also to Software.

Parties' Access Rights to Software do not include any right to receive source code or object code ported to a certain hardware platform or any right to receive respective Software documentation in any particular form or detail, but only as available from the Party granting the Access Rights.

## 10 Section: Non-disclosure of information

10.1 All information in whatever form or mode of communication, which is disclosed by a Party (the "Disclosing Party") to any other Party (the "Recipient") in connection with the Project during its implementation and which has been explicitly marked as "confidential" or with analogous mark at the time of disclosure, or when disclosed orally has been identified as confidential at the time of disclosure and has been confirmed and designated in writing within 15 calendar days from oral disclosure at the latest as confidential information by the Disclosing Party, is "Confidential Information".

10.2 The Recipients hereby undertake in addition and without prejudice to any commitment of non-disclosure under the Grant Agreement, for a period of 4 years after the end of the Project:

- not to use Confidential Information otherwise than for the purpose for which it was disclosed;
- not to disclose Confidential Information without the prior written consent by the Disclosing Party;
- to ensure that internal distribution of Confidential Information by a Recipient shall take place on a strict need-to-know basis; and
- to return to the Disclosing Party, or destroy, on request all Confidential Information that has been disclosed to the Recipients including all copies thereof and to delete all information stored in a machine readable form to the extent practically possible. The Recipients may keep a copy to the extent it is required to keep, archive or store such Confidential Information because of compliance with applicable laws and regulations or for the proof of on-going obligations provided that the Recipient comply with the confidentiality obligations herein contained with respect to such copy for as long as the copy is retained.

10.3 The Recipients shall be responsible for the fulfilment of the above obligations on the part of their employees or third parties involved in the Project and shall ensure that they remain so obliged, as far as legally possible, during and after the end of the Project and/or after the termination of the contractual relationship with the employee or third party.

10.4 The above shall not apply for disclosure or use of Confidential Information, if and in so far as the Recipient can show that:

- the Confidential Information has become or becomes publicly available by means other than a breach of the Recipient's confidentiality obligations;
- the Disclosing Party subsequently informs the Recipient that the Confidential Information is no longer confidential;
- the Confidential Information is communicated to the Recipient without any obligation of confidentiality by a third party who is to the best knowledge of the Recipient in lawful possession thereof and under no obligation of confidentiality to the Disclosing Party;
- the disclosure or communication of the Confidential Information is foreseen by provisions of the Grant Agreement;
- the Confidential Information, at any time, was developed by the Recipient completely independently of any such disclosure by the Disclosing Party;
- the Confidential Information was already known to the Recipient prior to disclosure; or
- the Recipient is required to disclose the Confidential Information in order to comply with applicable laws or regulations or with a court or administrative order, subject to the provision Section 10.7 hereunder.

10.5 The Recipient shall apply the same degree of care with regard to the Confidential Information disclosed within the scope of the Project as with its own confidential and/or proprietary information, but in no case less than reasonable care.

10.6 Each Party shall promptly advise the other Party in writing of any unauthorised disclosure, misappropriation or misuse of Confidential Information after it becomes aware of such unauthorised disclosure, misappropriation or misuse.

10.7 If any Party becomes aware that it will be required, or is likely to be required, to disclose Confidential Information in order to comply with applicable laws or regulations or with a court or administrative order, it shall, to the extent it is lawfully able to do so, prior to any such disclosure

- notify the Disclosing Party, and
- comply with the Disclosing Party's reasonable instructions to protect the confidentiality of the information.

10.8 For the sake of clarity, the provisions of this Section are in addition to any other obligation specified in the Grant Agreement (see Article 36).

## **11 Section: Miscellaneous**

### **11.1 Attachments, inconsistencies and severability**

This Consortium Agreement consists of this core text and:

Attachment 1 Background included

Attachment 2 Accession document

Attachment 3 Linked Third Parties

Attachment 4 Third parties to transfer the ownership of its Results

Attachment 5 Initial List of Subcontractors

Attachment 6 Bank account details

In case the terms of this Consortium Agreement are in conflict with the terms of the Grant Agreement, the terms of the latter shall prevail. In case of conflicts between the attachments and the core text of this Consortium Agreement, the latter shall prevail.

Should any provision of this Consortium Agreement become invalid, illegal or unenforceable, it shall not affect the validity of the remaining provisions of this Consortium Agreement. In such a case, the Parties concerned shall be entitled to request that a valid and practicable provision be negotiated that fulfils the purpose of the original provision.

### **11.2 No representation, partnership or agency**

Except as otherwise provided in Section 6.3.3 in relation with the role of the Coordinator, no Party shall be entitled to act or to make legally binding declarations on behalf of any other Party or of the consortium. Nothing in this Consortium Agreement shall be deemed to constitute a joint venture, agency, partnership, interest grouping or any other kind of formal business grouping or entity between the Parties.

### **11.3 Notices and other communication**

Any notice to be given under this Consortium Agreement shall be in writing to the addresses and recipients as listed in the most current address list kept by the Coordinator.

Formal notices:

If it is required in this Consortium Agreement that a formal notice, consent or approval shall be given, such notice shall be signed by a person or persons with the right to act on behalf of such Party and shall either be served personally or sent by mail with recorded delivery or mail with receipt acknowledgement.

Other communication:

Other communication between the Parties may also be effected by other means such as e-mail with acknowledgement of receipt, which fulfils the conditions of written form.

Any change of persons or contact details shall be notified immediately by the respective Party to the Coordinator. The address list shall be accessible to all Parties.

#### **11.4 Assignment and amendments**

Except as set out in Section 8.3 in relation with the Transfer of Results, no rights or obligations of the Parties arising from this Consortium Agreement may be assigned or transferred, in whole or in part, to any third party without the other Parties' prior formal approval.

Amendments and modifications to the text of this Consortium Agreement not explicitly listed in Section 6.3.1.2, require a separate written agreement to be signed between all Parties.

#### **11.5 Mandatory national law**

Nothing in this Consortium Agreement shall be deemed to require a Party to breach any mandatory statutory law under which the Party is operating.

To the extent any future mandatory law forbids or restricts any of the activities contemplated hereunder, the Parties agree to inform each other and discuss about the consequences thereof.

Each Party shall comply with all the relevant applicable laws and regulations relating to import/export and to all administrative acts of the relevant Governments pursuant such laws and regulations.

#### **11.6 Language**

This Consortium Agreement is drawn up in English, which language shall govern all documents, notices, meetings, arbitral proceedings and processes relative thereto.

#### **11.7 Applicable law**

This Consortium Agreement shall be construed in accordance with and governed by the laws of Belgium excluding its conflict of law provisions.

#### **11.8 Settlement of disputes**

The Parties shall endeavour to settle their disputes amicably within a period of sixty (60) calendar days.

If, and to the extent that, any such dispute, controversy or claim has not been settled pursuant to the mediation within 60 calendar days of the commencement of the amicable dispute, the courts of Brussels shall have exclusive jurisdiction.

Nothing in this Consortium Agreement shall limit the Parties' right to seek injunctive relief in any applicable competent court.

#### **11.9 Processing of Personal Data**

The Parties agree that any Confidential Information and/or any and all data and/or information that is provided, disclosed or otherwise made available between the Parties in the execution of the Grant Agreement and/or under this Consortium Agreement, shall not include Personal Data as defined by Article 4 of the (EU) Reg. 2016/679 General Data Protection Regulation (GDPR).

Accordingly, each Party will use reasonable endeavours to ensure that all data and information to be shared is anonymized and functionally separated, whenever possible, such that it is no longer Personal Data, prior to providing the Confidential Information to the other Parties. The Data Management Plan will provide specific information on how personal and non-personal research data are curated.

With exception to the generality of the principle described above, to the extent that data and information described herein contains Personal Data or, where the fulfilment of the Grant Agreement necessitates the processing of Personal Data, the provisions below shall apply:

-The Parties shall comply with and shall remain in compliance with applicable EU regulation, particularly the GDPR and national laws on data protection in the sharing of Personal Data with or accepting of Personal Data from each other which is processed under or in connection with the Grant Agreement and/or this Consortium Agreement.

In particular, if it is required, the Parties shall act in concert to assess data protection impacts and adopt organizational and technical measures to ensure compliance to specific obligations and applicable legal frameworks. Data Protection Officers, Ethical Committees and/or Legal Offices might be involved in this process. To this end, the Coordinator declares to have appointed a data protection officer (email: dpo@indra.es), the other Parties will communicate their dpo's contacts to the Coordinator accordingly.

- As far as persons recruited within the project are concerned, each Partner undertakes any data processing related to select, manage, and certificate the candidates carriers, acting as Data Controller. The Parties agree to collect, store and, more generally, process candidates' personal data in compliance with the applicable legal framework and, in particular, to inform any data subject under articles 13 and 14 GDPR.

Any personal data under the Grant Agreement will be processed by the Funding Authority in accordance with the provisions of Article 39 of the Grant Agreement.

## **12 Section Signatures**

### **AS WITNESS:**

The Parties have caused this Consortium Agreement to be duly signed by the undersigned authorized representatives, in separate signature pages, the day and year stated therein.

**INDRA SISTEMAS S.A.**

Name(s)	Title(s)	Date
Isabel González Hervás		15th of April 2021
Signature		

Name(s)	Title(s)	Date
Miguel Angel Acitores Villazan		15th of April 2021
Signature		



**UNIVERSIDAD DE MURCIA**

Name(s)	Title(s)	Date
María Senena Corbalán		15th of April 2021
Signature		

**KENTRO MELETON ASFALEIAS**

Name(s)	Title(s)	Date
Theodoros Dravillas		15th of April 2021
Signature		

**TASSICA EMERGENCY, TRAINING & RESEARCH S.A.**

Name(s)	Title(s)	Date
Carlos I. Sierra Berrocal		15th of April 2021
Signature		

**INTERNATIONAL SECURITY AND EMERGENCY MANAGEMENT INSTITUTE**

Name(s)	Title(s)	Date
Lubomir Zapotocny		15th of April 2021
Signature		

**SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO SANT'ANNA**

Name(s)	Title(s)	Date
Sabina Nuti		15th of April 2021
Signature		

**BLOCKCHAIN2050 BV**

Name(s)	Title(s)	Date
Peter Tjia		15th of April 2021
Signature		

**BULGARIAN DEFENCE INSTITUTE**

Name(s)	Title(s)	Date
Dimitar Kirkov		15th of April 2021
Signature		

**BULGARIAN RED CROSS**

Name(s)	Title(s)	Date
		15th of April 2021
Signature		



**ARATOS.NET LTD**

Name(s)	Title(s)	Date
Eleftheria Tsialtzoudi		15th of April 2021
Signature		

**HOSPITAL DO ESPIRITO SANTO ÉVORA**

Name(s)	Title(s)	Date
		15th of April 2021
Signature		

**UNIVERSITY OF SOUTH-EASTERN NORWAY**

Name(s)	Title(s)	Date
		15th of April 2021
Signature		

**AZIENDA REGIONALE EMERGENZA URGENZA**

Name(s)	Title(s)	Date
Giuseppe Maria Sechi		15th of April 2021
Signature		

**HELLENIC RESCUE TEAM**

Name(s)	Title(s)	Date
		15th of April 2021
Signature		

**NOVOTEC**

Name(s)	Title(s)	Date
Julián Mayor Balvis		15th of April 2021
Signature		

**PARTICLE SUMMARY**

Name(s)	Title(s)	Date
		15th of April 2021
Signature		

## **Attachment 1: Background included**

### **UNIVERSIDAD DE MURCIA**

As to UNIVERSIDAD DE MURCIA, it is agreed between the Parties that, to the best of their knowledge, no data, know-how or information of UNIVERSIDAD DE MURCIA shall be Needed by another Party for implementation of the Project (Article 25.2 Grant Agreement) or Exploitation of that other Party's Results (Article 25.3 Grant Agreement).

This represents the status at the time of signature of this Consortium Agreement.

### **Center for Security Studies (KEMEA)**

As to Center for Security Studies, it is agreed between the Parties that, to the best of their knowledge, no data, know-how or information of Center for Security Studies shall be Needed by another Party for implementation of the Project (Article 25.2 Grant Agreement) or Exploitation of that other Party's Results (Article 25.3 Grant Agreement).

This represents the status at the time of signature of this Consortium Agreement.

### **TASSICA EMERGENCY TRAINING & RESEARCH SA (TASSICA)**

As to TASSICA, it is agreed between the Parties that, to the best of their knowledge, no data, know-how or information of TASSICA shall be Needed by another Party for implementation of the Project (Article 25.2 Grant Agreement) or Exploitation of that other Party's Results (Article 25.3 Grant Agreement).

This represents the status at the time of signature of this Consortium Agreement.

### **ISEM-INSTITUT PRE MEDZINARODNU BEZPECNOST A KRIZOVE RIADENIE, NO (ISEMI)**

As to ISEMI, it is agreed between the Parties that, to the best of their knowledge, no data, know-how or information of ISEMI shall be Needed by another Party for implementation of the Project (Article 25.2 Grant Agreement) or Exploitation of that other Party's Results (Article 25.3 Grant Agreement).

This represents the status at the time of signature of this Consortium Agreement.



### **SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO S ANNA (SSS)**

As to SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO S ANNA, it is agreed between the Parties that, to the best of their knowledge, no data, know-how or information of SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO S ANNA shall be Needed by another Party for implementation of the Project (Article 25.2 Grant Agreement) or Exploitation of that other Party's Results (Article 25.3 Grant Agreement).

This represents the status at the time of signature of this Consortium Agreement.

### **BLOCKCHAIN2050 BV (BC2050)**

As to BLOCKCHAIN2050 BV, it is agreed between the Parties that, to the best of their knowledge, no data, know-how or information of BLOCKCHAIN2050 BV shall be Needed by another Party for implementation of the Project (Article 25.2 Grant Agreement) or Exploitation of that other Party's Results (Article 25.3 Grant Agreement).

This represents the status at the time of signature of this Consortium Agreement.

### **INSTITUT PO OTBRANA (BDI)**

As to BDI, it is agreed between the Parties that, to the best of their knowledge, no data, know-how or information of BDI shall be Needed by another Party for implementation of the Project (Article 25.2 Grant Agreement) or Exploitation of that other Party's Results (Article 25.3 Grant Agreement).

This represents the status at the time of signature of this Consortium Agreement.

### **BULGARIAN RED CROSS (BRC)**

As to BRC, it is agreed between the Parties that, to the best of their knowledge, no data, know-how or information of BRC shall be Needed by another Party for implementation of the Project (Article 25.2 Grant Agreement) or Exploitation of that other Party's Results (Article 25.3 Grant Agreement).

This represents the status at the time of signature of this Consortium Agreement.

### **ARATOS NTOT NET LTD (ARATOS)**

As to ARATOS, it is agreed between the Parties that, to the best of their knowledge, no data, know-how or information of ARATOS shall be Needed by another Party for implementation of the Project (Article 25.2 Grant Agreement) or Exploitation of that other Party's Results (Article 25.3 Grant Agreement).

This represents the status at the time of signature of this Consortium Agreement.

#### **HOSPITAL DO ESPIRITO SANTO DE EVORA EPE (HESE)**

As to HOSPITAL DO ESPIRITO SANTO DE EVORA EPE, it is agreed between the Parties that, to the best of their knowledge, no data, know-how or information of HOSPITAL DO ESPIRITO SANTO DE EVORA EPE shall be Needed by another Party for implementation of the Project (Article 25.2 Grant Agreement) or Exploitation of that other Party's Results (Article 25.3 Grant Agreement).

This represents the status at the time of signature of this Consortium Agreement.

#### **UNIVERSITETET I SOROST-NORGE (USN)**

As to UNIVERSITETET I SOROST-NORGE, it is agreed between the Parties that, to the best of their knowledge, no data, know-how or information of UNIVERSITETET I SOROST-NORGE shall be Needed by another Party for implementation of the Project (Article 25.2 Grant Agreement) or Exploitation of that other Party's Results (Article 25.3 Grant Agreement).

This represents the status at the time of signature of this Consortium Agreement.

#### **Azienda Regionale Emergenza Urgenza (AREU)**

As to AREU, it is agreed between the Parties that, to the best of their knowledge, no data, know-how or information of AREU shall be Needed by another Party for implementation of the Project (Article 25.2 Grant Agreement) or Exploitation of that other Party's Results (Article 25.3 Grant Agreement).

This represents the status at the time of signature of this Consortium Agreement.

#### **ELLINIKI OMADA DIASOSIS SOMATEIO (HRT)**

As to HRT, it is agreed between the Parties that, to the best of their knowledge, no data, know-how or information of HRT shall be Needed by another Party for implementation of the Project (Article 25.2 Grant Agreement) or Exploitation of that other Party's Results (Article 25.3 Grant Agreement).

This represents the status at the time of signature of this Consortium Agreement.

#### **NOVOTEC CONSULTORES SA (NOVOTEC)**

As to NOVOTEC, it is agreed between the Parties that, to the best of their knowledge, no data, know-how or information of NOVOTEC shall be Needed by another Party for implementation of the Project (Article 25.2 Grant Agreement) or Exploitation of that other Party's Results (Article 25.3 Grant Agreement).

This represents the status at the time of signature of this Consortium Agreement.

**PARTICLE SUMMARY LDA (PARTICLE)**

As to PARTICLE SUMMARY LDA (PARTICLE), it is agreed between the Parties that, to the best of their knowledge

The following background is hereby identified and agreed upon for the Project. Specific limitations and/or conditions, shall be as mentioned hereunder:

Describe Background	Specific limitations and/or conditions for implementation (Article 25.2 Grant Agreement)	Specific limitations and/or conditions (Grant Agreement)
<b>Mobile Situational Awareness Tools</b> - A set of Mobile Situational Awareness Tools have been developed by PARTICLE to support mobile units operating in security and emergency situations. The Mobile Situational Awareness Tools allow operational and C2 units to visualise and understand tactical scenarios based on shared information and intelligence, reflected in interactive dashboards, maps, statistics, charts, briefings, reports and alerts. The Tools support data collected from mobile devices, wearables and deliver blue force tracking for enhanced communications and information exchange.	The structure and content of this background consists of PARTICLE's IPR, not to be used or redistributed by any other party without PARTICLE's separate license agreement and license fees. PARTICLE is the sole responsible for any development/reconfiguration actions related to use, adaptation and extension of the mentioned background within the VALKYRIES Project's respective implementation tasks. The documented information related to the structure and content of this background consists of PARTICLE's IPR, not to be used or redistributed by any other party without PARTICLE's written approval.	The structure and content of this background consists of PARTICLE's IPR. PARTICLE's Mobile Situational Awareness Tools is subjected only to PARTICLE's exploitation strategies to be defined within the VALKYRIES Project's course and their exploitation is not permitted to any other party without a separate license agreement and license fees. Within VALKYRIES Project's Exploitation context, PARTICLE will make the Mobile Situational Awareness Tools available at fair market conditions to VALKYRIES partners.
eSafer Emergency App for Citizens – eSafer is a mobile application for citizens to contact 112 services or third-party emergency service providers to report disaster and/or emergency incidents, using multi-channels such as messaging, images, video and automatic location. Upholding responsible citizenship, eSafer includes social functions, such as one-to-one (e.g., officer to citizen private message) and one-to-many (e.g., officer to citizens geo-cast message), thus supporting public alerting from	The structure and content of this background consists of PARTICLE's IPR, not to be used or redistributed by any other party without PARTICLE's separate license agreement and license fees. PARTICLE is the sole responsible for any development/reconfiguration actions related to use, adaptation and extension of the mentioned background within the VALKYRIES Project's respective implementation tasks. The documented information related to the structure and content of this	The structure and content of this background consists of PARTICLE's IPR. PARTICLE's eSafer App is subjected only to PARTICLE's exploitation strategies to be defined within the VALKYRIES Project's course and their exploitation is not permitted to any other party without a separate license agreement and license fees. Within VALKYRIES Project's Exploitation context, PARTICLE will make the eSafer App available at fair market conditions to VALKYRIES partners.

public authorities on mass casualty incidents. The eSafer App also allows citizens not only to maintain contact with the emergency authorities and receive new situation updates, but also to receive instructions or guidance on how to adequately manage the emergency situation until the arrival of first responders, saving lives in the process.	background consists of PARTICLE's IPR, not to be used or redistributed by any other party without PARTICLE's written approval.	
eSafer Platform - The eSafer Platform is a situational awareness tool that provides an intuitive and comprehensive disaster/emergency incident management system, displaying the citizens' reported events, in a georeferenced context and associated with multimedia data (photos, videos and text), that clearly identify the incident's type, severity, location and time, as well as its status (open, closed, waiting for dispatch, dispatch sent). All reported disasters/emergencies in the eSafer Platform present a trustworthiness factor (verified vs. non-verified) to determine the degree of trust on the information source. This information enables the generation of the big picture of a mass casualty event and truly understand the nature and level of the emergencies. The eSafer Platform enables the monitoring of the disaster/emergency response effort, as well as the dissemination of public alerts and emergency-related information to citizens, through the eSafer Emergency App for Citizens.	The structure and content of this background consists of PARTICLE's IPR, not to be used or redistributed by any other party without PARTICLE's separate license agreement and license fees. PARTICLE is the sole responsible for any development/reconfiguration actions related to use, adaptation and extension of the mentioned background within the VALKYRIES Project's respective implementation tasks. The documented information related to the structure and content of this background consists of PARTICLE's IPR, not to be used or redistributed by any other party without PARTICLE's written approval.	The structure and content of this background consists of PARTICLE's IPR. PARTICLE's eSafer Platform is subjected only to PARTICLE's exploitation strategies to be defined within the VALKYRIES Project's course and their exploitation is not permitted to any other party without a separate license agreement and license fees. Within VALKYRIES Project's Exploitation context, PARTICLE will make the eSafer Platform available at fair market conditions to VALKYRIES partners.

This represents the status at the time of signature of this Consortium Agreement.

## Attachment 2: Accession document

ACCESSION

of a new Party to

**[Acronym of the Project] Consortium Agreement, version [..., YYYY-MM-DD]**

**[OFFICIAL NAME OF THE NEW PARTY AS IDENTIFIED IN THE Grant Agreement]**

hereby consents to become a Party to the Consortium Agreement identified above and accepts all the rights and obligations of a Party starting [date].

**[OFFICIAL NAME OF THE COORDINATOR AS IDENTIFIED IN THE Grant Agreement]**

hereby certifies that the consortium has accepted in the meeting held on [date] the accession of [the name of the new Party] to the consortium starting [date].

This Accession document has been done in 2 originals to be duly signed by the undersigned authorised representatives.

**[Date and Place]**

**[INSERT NAME OF THE NEW PARTY]**

Signature(s)

Name(s)

Title(s)

**[Date and Place]**

**[INSERT NAME OF THE COORDINATOR]**

Signature(s)

Name(s)

Title(s)

### **Attachment 3: Linked Third Parties**

**INDRA FACTORÍA TECNOLÓGICA, S.L.U. (IFT)** with PIC number 899914203 and registered address at AVENIDA DE BRUSELAS 35 28108, ALCOBENDAS Spain.

**FUNDACIÓN PARA LA INVESTIGACIÓN E INNOVACIÓN BIOSANITARIA DE ATENCIÓN PRIMARIA (FIIBAP)** with PIC number 919231753 and registered address at AVENIDA REINA VICTORIA 21, 6ª Planta 28003, MADRID Spain.

**Attachment 4: Third parties to transfer the ownership of its Results**

**Attachment 5 : Initial List of Subcontractors**



## **Attachment 6: Bank account details**

Each Party shall send the following information to the Coordinator within five (5) working days from the signature of the Consortium Agreement.

### BANKING DETAILS:

ACCOUNT NAME

IBAN/ACCOUNT NUMBER

BIC/SWIFT CODE

BRANCH CODE

BANK NAME

ADDRESS OF BANK BRANCH

### ACCOUNT HOLDER'S DATA:

ACCOUNT HOLDER

STREET & NUMBER

TOWN/CITY

POSTCODE

COUNTRY



**EUROPEAN COMMISSION**  
Research Executive Agency

Director



## GRANT AGREEMENT

**NUMBER 101020676 — VALKYRIES**

This **Agreement** ('the Agreement') is **between** the following parties:

**on the one part,**

the **Research Executive Agency (REA)** ('the Agency'), under the powers delegated by the European Commission ('the Commission'), represented for the purposes of signature of this Agreement by HoU, Research Executive Agency , Industrial Leadership and Societal Challenges, Safeguarding Secure Society, Angelo MARINO,

**and**

**on the other part,**

1. 'the coordinator':

**INDRA SISTEMAS SA (INDRA)**, established in AVENIDA DE BRUSELAS 35, ALCOBENDAS MADRID 28108, Spain, VAT number: ESA28599033, represented for the purposes of signing the Agreement by Jesús Angel GARCÍA SÁNCHEZ

and the following other beneficiaries, if they sign their 'Accession Form' (see Annex 3 and Article 56):

2. **SERVICIO MADRILENO DE SALUD (SERMAS)**, established in PLAZA CARLOS TRIAS BERTRAN 7, MADRID 28020, Spain, VAT number: ESQ2801221I,

3. **TASSICA EMERGENCY TRAINING & RESEARCH SA (TASSICA SA)**, established in CALLE JOSE ZORRILLA 132 1E, SEGOVIA 40002, Spain, VAT number: ESA40238560,

4. **ISEM-INSTITUT PRE MEDZINARODNU BEZPECNOST A KRIZOVE RIADENIE, NO (ISEMI)**, established in VYSOKOSKOLAKOV 41, ZILINA 010 08, Slovakia, VAT number: SK2024121704,

5. **UNIVERSIDAD DE MURCIA (UMU)**, established in AVENIDA TENIENTE FLORESTA S/N - EDIFICIO CONVALECENCIA, MURCIA 30003, Spain, VAT number: ESQ3018001B,

6. **SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO S ANNA (SSS)**, established in PIAZZA MARTIRI DELLA LIBERTA 33, PISA 56127, Italy, VAT number: IT01118840501,

7. **BLOCKCHAIN2050 BV (BC2050)**, established in Stationsplein 45, Rotterdam 3013 AK, Netherlands, VAT number: NL858762870B01,
8. **INSTITUT PO OTBRANA (BDI)**, established in prof. Tsvetan Lazarov blvd. 2, Sofia 1574, Bulgaria, VAT number: BG129010036,
9. **BULGARIAN RED CROSS (BRC)**, established in 76 JAMES BOURCHIER BLVD, SOFIA 1407, Bulgaria, VAT number: BG000703415,
10. **KENTRO MELETON ASFALEIAS (KEMEA)**, established in P KANELLOPOULOU 4 ST, ATHINA 10177, Greece, VAT number: EL999333507,
11. **HOSPITAL DO ESPIRITO SANTO DE EVORA EPE (HESE)**, established in LARGO SENHOR DA POBREZA, EVORA 7000 811, Portugal, VAT number: PT508085888,
12. **ARATOS NTOT NET LTD (ARATOS.NET)**, established in ARTEMIDOS 36, PALAIO FALIRO 175 61, Greece, VAT number: EL999021604,
13. **UNIVERSITETET I SOROST-NORGE (USN)**, established in KJOLNES RING 56, PORSGRUNN 3918, Norway, VAT number: NO911770709MVA,
14. **Azienda Regionale Emergenza Urgenza (AREU)**, established in Via Alfredo Campanini 6, Milano 20124, Italy, VAT number: IT03128170135,
15. **ELLINIKI OMADA DIASOSIS SOMATEIO (HRT)**, established in EMM PAPA 5, THESSALONIKI 54 248, Greece, VAT number: EL090197790,
16. **NOVOTEC CONSULTORES SA (NOVOTEC)**, established in CALLE CAMPEZO 1 EDIFICIO 3 PARQUE EMPRESARIAL DE LAS MERCEDES, MADRID 28022, Spain, VAT number: ESA78068202,
17. **PARTICLE SUMMARY (PARTICLE)**, established in RUA DA VENEZUELA N 29 14 E, LISBON 1500 618, Portugal, VAT number: PT514686154,

Unless otherwise specified, references to ‘beneficiary’ or ‘beneficiaries’ include the coordinator.

The parties referred to above have agreed to enter into the Agreement under the terms and conditions below.

By signing the Agreement or the Accession Form, the beneficiaries accept the grant and agree to implement it under their own responsibility and in accordance with the Agreement, with all the obligations and conditions it sets out.

The Agreement is composed of:

Terms and Conditions

- |         |   |
|---------|---|
| Annex 1 | Description of the action                             |
| Annex 2 | Estimated budget for the action                       |
|         | 2a Additional information on the estimated budget     |
| Annex 3 | Accession Forms                                       |
| Annex 4 | Model for the financial statements                    |
| Annex 5 | Model for the certificate on the financial statements |
| Annex 6 | Model for the certificate on the methodology          |

# TERMS AND CONDITIONS

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## **CHAPTER 1 GENERAL**

### **ARTICLE 1 — SUBJECT OF THE AGREEMENT**

This Agreement sets out the rights and obligations and the terms and conditions applicable to the grant awarded to the beneficiaries for implementing the action set out in Chapter 2.

## **CHAPTER 2 ACTION**

### **ARTICLE 2 — ACTION TO BE IMPLEMENTED**

The grant is awarded for the action entitled ‘**Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters**’ — ‘**VALKYRIES**’ (‘**action**’), as described in Annex 1.

### **ARTICLE 3 — DURATION AND STARTING DATE OF THE ACTION**

The duration of the action will be **24 months** as of 1 October 2021 (‘**starting date of the action**’).

### **ARTICLE 4 — ESTIMATED BUDGET AND BUDGET TRANSFERS**

#### **4.1 Estimated budget**

The ‘**estimated budget**’ for the action is set out in Annex 2.

It contains the estimated eligible costs and the forms of costs, broken down by beneficiary (and linked third party) and budget category (see Articles 5, 6, and 14).

#### **4.2 Budget transfers**

The estimated budget breakdown indicated in Annex 2 may be adjusted — without an amendment (see Article 55) — by transfers of amounts between beneficiaries, budget categories and/or forms of costs set out in Annex 2, if the action is implemented as described in Annex 1.

However, the beneficiaries may not add costs relating to subcontracts not provided for in Annex 1, unless such additional subcontracts are approved by an amendment or in accordance with Article 13.

## **CHAPTER 3 GRANT**

### **ARTICLE 5 — GRANT AMOUNT, FORM OF GRANT, REIMBURSEMENT RATES AND FORMS OF COSTS**

#### **5.1 Maximum grant amount**

The ‘**maximum grant amount**’ is **EUR 5 995 757.50** (five million nine hundred and ninety five thousand seven hundred and fifty seven EURO and fifty eurocents).

#### **5.2 Form of grant, reimbursement rates and forms of costs**

The grant reimburses **100% of the eligible costs of the beneficiaries and the affiliated entities that are non-profit legal entities and 70% of the eligible costs of the beneficiaries and the affiliated entities that are profit legal entities** (see Article 6) (**‘reimbursement of eligible costs grant’**) (see Annex 2).

The estimated eligible costs of the action are EUR **6 895 326.25** (six million eight hundred and ninety five thousand three hundred and twenty six EURO and twenty five eurocents).

Eligible costs (see Article 6) must be declared under the following forms (**‘forms of costs’**):

(a) for **direct personnel costs**:

- as actually incurred costs (**‘actual costs’**) or
- on the basis of an amount per unit calculated by the beneficiary in accordance with its usual cost accounting practices (**‘unit costs’**).

Personnel **costs for SME owners or beneficiaries that are natural persons** not receiving a salary (see Article 6.2, Points A.4 and A.5) must be declared on the basis of the amount per unit set out in Annex 2a (**unit costs**);

(b) for **direct costs for subcontracting**: as actually incurred costs (**actual costs**);

(c) for **direct costs of providing financial support to third parties**: not applicable;

(d) for **other direct costs**:

- for costs of internally invoiced goods and services: on the basis of an amount per unit calculated by the beneficiary in accordance with its usual cost accounting practices (**‘unit costs’**);
- for all other costs: as actually incurred costs (**actual costs**);

(e) for **indirect costs**: on the basis of a flat-rate applied as set out in Article 6.2, Point E (**‘flat-rate costs’**);

(f) **specific cost category(ies)**: not applicable.

### 5.3 Final grant amount — Calculation

The **‘final grant amount’** depends on the actual extent to which the action is implemented in accordance with the Agreement’s terms and conditions.

This amount is calculated by the Agency — when the payment of the balance is made (see Article 21.4) — in the following steps:

Step 1 — Application of the reimbursement rates to the eligible costs

Step 2 — Limit to the maximum grant amount

Step 3 — Reduction due to the no-profit rule

Step 4 — Reduction due to substantial errors, irregularities or fraud or serious breach of obligations

### 5.3.1 Step 1 — Application of the reimbursement rates to the eligible costs

The reimbursement rate(s) (see Article 5.2) are applied to the eligible costs (actual costs, unit costs and flat-rate costs; see Article 6) declared by the beneficiaries and linked third parties (see Article 20) and approved by the Agency (see Article 21).

### 5.3.2 Step 2 — Limit to the maximum grant amount

If the amount obtained following Step 1 is higher than the maximum grant amount set out in Article 5.1, it will be limited to the latter.

### 5.3.3 Step 3 — Reduction due to the no-profit rule

The grant must not produce a profit.

‘**Profit**’ means the surplus of the amount obtained following Steps 1 and 2 plus the action’s total receipts, over the action’s total eligible costs.

The ‘**action’s total eligible costs**’ are the consolidated total eligible costs approved by the Agency.

The ‘**action’s total receipts**’ are the consolidated total receipts generated during its duration (see Article 3).

The following are considered **receipts**:

- (a) income generated by the action; if the income is generated from selling equipment or other assets purchased under the Agreement, the receipt is up to the amount declared as eligible under the Agreement;
- (b) financial contributions given by third parties to the beneficiary or to a linked third party specifically to be used for the action, and
- (c) in-kind contributions provided by third parties free of charge and specifically to be used for the action, if they have been declared as eligible costs.

The following are however not considered receipts:

- (a) income generated by exploiting the action’s results (see Article 28);
- (b) financial contributions by third parties, if they may be used to cover costs other than the eligible costs (see Article 6);
- (c) financial contributions by third parties with no obligation to repay any amount unused at the end of the period set out in Article 3.

If there is a profit, it will be deducted from the amount obtained following Steps 1 and 2.

### 5.3.4 Step 4 — Reduction due to substantial errors, irregularities or fraud or serious breach of obligations — Reduced grant amount — Calculation

If the grant is reduced (see Article 43), the Agency will calculate the reduced grant amount by deducting the amount of the reduction (calculated in proportion to the seriousness of the errors, irregularities or fraud or breach of obligations, in accordance with Article 43.2) from the maximum grant amount set out in Article 5.1.

The final grant amount will be the lower of the following two:

- the amount obtained following Steps 1 to 3 or
- the reduced grant amount following Step 4.

#### 5.4 Revised final grant amount — Calculation

If — after the payment of the balance (in particular, after checks, reviews, audits or investigations; see Article 22) — the Agency rejects costs (see Article 42) or reduces the grant (see Article 43), it will calculate the ‘**revised final grant amount**’ for the beneficiary concerned by the findings.

This amount is calculated by the Agency on the basis of the findings, as follows:

- in case of **rejection of costs**: by applying the reimbursement rate to the revised eligible costs approved by the Agency for the beneficiary concerned;
- in case of **reduction of the grant**: by calculating the concerned beneficiary’s share in the grant amount reduced in proportion to the seriousness of the errors, irregularities or fraud or breach of obligations (see Article 43.2).

In case of **rejection of costs and reduction of the grant**, the revised final grant amount for the beneficiary concerned will be the lower of the two amounts above.

### ARTICLE 6 — ELIGIBLE AND INELIGIBLE COSTS

#### 6.1 General conditions for costs to be eligible

‘**Eligible costs**’ are costs that meet the following criteria:

(a) for **actual costs**:

- (i) they must be actually incurred by the beneficiary;
- (ii) they must be incurred in the period set out in Article 3, with the exception of costs relating to the submission of the periodic report for the last reporting period and the final report (see Article 20);
- (iii) they must be indicated in the estimated budget set out in Annex 2;
- (iv) they must be incurred in connection with the action as described in Annex 1 and necessary for its implementation;
- (v) they must be identifiable and verifiable, in particular recorded in the beneficiary’s accounts in accordance with the accounting standards applicable in the country where the beneficiary is established and with the beneficiary’s usual cost accounting practices;



- (vi) they must comply with the applicable national law on taxes, labour and social security, and
- (vii) they must be reasonable, justified and must comply with the principle of sound financial management, in particular regarding economy and efficiency;

(b) for **unit costs**:

- (i) they must be calculated as follows:

{amounts per unit set out in Annex 2a or calculated by the beneficiary in accordance with its usual cost accounting practices (see Article 6.2, Point A and Article 6.2.D.5)}

multiplied by

the number of actual units};

- (ii) the number of actual units must comply with the following conditions:

- the units must be actually used or produced in the period set out in Article 3;
- the units must be necessary for implementing the action or produced by it, and
- the number of units must be identifiable and verifiable, in particular supported by records and documentation (see Article 18);

(c) for **flat-rate costs**:

- (i) they must be calculated by applying the flat-rate set out in Annex 2, and
- (ii) the costs (actual costs or unit costs) to which the flat-rate is applied must comply with the conditions for eligibility set out in this Article.

## 6.2 Specific conditions for costs to be eligible

Costs are eligible if they comply with the general conditions (see above) and the specific conditions set out below for each of the following budget categories:

- A. direct personnel costs;
- B. direct costs of subcontracting;
- C. not applicable;
- D. other direct costs;
- E. indirect costs;
- F. not applicable.

‘Direct costs’ are costs that are directly linked to the action implementation and can therefore be attributed to it directly. They must not include any indirect costs (see Point E below).

‘Indirect costs’ are costs that are not directly linked to the action implementation and therefore cannot be attributed directly to it.

### A. Direct personnel costs

#### Types of eligible personnel costs

A.1 Personnel costs are eligible, if they are related to personnel working for the beneficiary under an employment contract (or equivalent appointing act) and assigned to the action (**‘costs for employees (or equivalent)’**). They must be limited to salaries (including during parental leave), social security contributions, taxes and other costs included in the **remuneration**, if they arise from national law or the employment contract (or equivalent appointing act).

Beneficiaries that are non-profit legal entities<sup>1</sup> may also declare as personnel costs **additional remuneration** for personnel assigned to the action (including payments on the basis of supplementary contracts regardless of their nature), if:

- (a) it is part of the beneficiary’s usual remuneration practices and is paid in a consistent manner whenever the same kind of work or expertise is required;
- (b) the criteria used to calculate the supplementary payments are objective and generally applied by the beneficiary, regardless of the source of funding used.

‘Additional remuneration’ means any part of the remuneration which exceeds what the person would be paid for time worked in projects funded by national schemes.

Additional remuneration for personnel assigned to the action is eligible up to the following amount:

- (a) if the person works full time and exclusively on the action during the full year: up to EUR 8 000;
- (b) if the person works exclusively on the action but not full-time or not for the full year: up to the corresponding pro-rata amount of EUR 8 000, or
- (c) if the person does not work exclusively on the action: up to a pro-rata amount calculated as follows:

$$\left\{ \begin{array}{l} \text{EUR 8 000} \\ \text{divided by} \\ \text{the number of annual productive hours (see below)}, \\ \text{multiplied by} \\ \text{the number of hours that the person has worked on the action during the year} \end{array} \right\}.$$

A.2 The **costs for natural persons working under a direct contract** with the beneficiary other than an employment contract are eligible personnel costs, if:

- (a) the person works under conditions similar to those of an employee (in particular regarding the way the work is organised, the tasks that are performed and the premises where they are performed);
- (b) the result of the work carried out belongs to the beneficiary (unless exceptionally agreed otherwise), and

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<sup>1</sup> For the definition, see Article 2.1(14) of the Rules for Participation Regulation No 1290/2013: ‘**non-profit legal entity**’ means a legal entity which by its legal form is non-profit-making or which has a legal or statutory obligation not to distribute profits to its shareholders or individual members.

- (c) the costs are not significantly different from those for personnel performing similar tasks under an employment contract with the beneficiary.

A.3 The **costs of personnel seconded by a third party against payment** are eligible personnel costs, if the conditions in Article 11.1 are met.

A.4 **Costs of owners** of beneficiaries that are small and medium-sized enterprises (**'SME owners'**) who are working on the action and who do not receive a salary are eligible personnel costs, if they correspond to the amount per unit set out in Annex 2a multiplied by the number of actual hours worked on the action.

A.5 **Costs of 'beneficiaries that are natural persons'** not receiving a salary are eligible personnel costs, if they correspond to the amount per unit set out in Annex 2a multiplied by the number of actual hours worked on the action.

### Calculation

Personnel costs must be calculated by the beneficiaries as follows:

{ {hourly rate  
multiplied by  
the number of actual hours worked on the action},  
plus  
for non-profit legal entities: additional remuneration to personnel assigned to the action under the  
conditions set out above (Point A.1)}.

The number of actual hours declared for a person must be identifiable and verifiable (see Article 18).

The total number of hours declared in EU or Euratom grants, for a person for a year, cannot be higher than the annual productive hours used for the calculations of the hourly rate. Therefore, the maximum number of hours that can be declared for the grant are:

{number of annual productive hours for the year (see below)  
minus  
total number of hours declared by the beneficiary, for that person in that year, for other EU or Euratom  
grants}.

The **'hourly rate'** is one of the following:

- (a) for personnel costs declared as **actual costs** (i.e. budget categories A.1, A.2, A.3): the hourly rate is calculated *per full financial year*, as follows:

{actual annual personnel costs (excluding additional remuneration) for the person  
divided by  
number of annual productive hours}.

using the personnel costs and the number of productive hours for each full financial year covered by the reporting period concerned. If a financial year is not closed at the end of the

reporting period, the beneficiaries must use the hourly rate of the last closed financial year available.

For the ‘number of annual productive hours’, the beneficiaries may choose one of the following:

- (i) ‘fixed number of hours’: 1 720 hours for persons working full time (or corresponding pro-rata for persons not working full time);
- (ii) ‘individual annual productive hours’: the total number of hours worked by the person in the year for the beneficiary, calculated as follows:

{annual workable hours of the person (according to the employment contract, applicable collective labour agreement or national law)

plus

overtime worked

minus

absences (such as sick leave and special leave)}.

‘Annual workable hours’ means the period during which the personnel must be working, at the employer’s disposal and carrying out his/her activity or duties under the employment contract, applicable collective labour agreement or national working time legislation.

If the contract (or applicable collective labour agreement or national working time legislation) does not allow to determine the annual workable hours, this option cannot be used;

- (iii) ‘standard annual productive hours’: the ‘standard number of annual hours’ generally applied by the beneficiary for its personnel in accordance with its usual cost accounting practices. This number must be at least 90% of the ‘standard annual workable hours’.

If there is no applicable reference for the standard annual workable hours, this option cannot be used.

For all options, the actual time spent on **parental leave** by a person assigned to the action may be deducted from the number of annual productive hours.

As an alternative, beneficiaries may calculate the hourly rate *per month*, as follows:

{actual monthly personnel cost (excluding additional remuneration) for the person

divided by

{number of annual productive hours / 12}}}

using the personnel costs for each month and (one twelfth of) the annual productive hours calculated according to either option (i) or (iii) above, i.e.:

- fixed number of hours or
- standard annual productive hours.

Time spent on **parental leave** may not be deducted when calculating the hourly rate per month. However, beneficiaries may declare personnel costs incurred in periods of parental leave in proportion to the time the person worked on the action in that financial year.

If parts of a basic remuneration are generated over a period longer than a month, the beneficiaries may include only the share which is generated in the month (irrespective of the amount actually paid for that month).

Each beneficiary must use only one option (per full financial year or per month) for each full financial year;

(b) for personnel costs declared on the basis of **unit costs** (i.e. budget categories A.1, A.2, A.4, A.5): the hourly rate is one of the following:

- (i) for SME owners or beneficiaries that are natural persons: the hourly rate set out in Annex 2a (see Points A.4 and A.5 above), or
- (ii) for personnel costs declared on the basis of the beneficiary's usual cost accounting practices: the hourly rate calculated by the beneficiary in accordance with its usual cost accounting practices, if:
  - the cost accounting practices used are applied in a consistent manner, based on objective criteria, regardless of the source of funding;
  - the hourly rate is calculated using the actual personnel costs recorded in the beneficiary's accounts, excluding any ineligible cost or costs included in other budget categories.

The actual personnel costs may be adjusted by the beneficiary on the basis of budgeted or estimated elements. Those elements must be relevant for calculating the personnel costs, reasonable and correspond to objective and verifiable information;

and

- the hourly rate is calculated using the number of annual productive hours (see above).

**B. Direct costs of subcontracting** (including related duties, taxes and charges such as non-deductible value added tax (VAT) paid by the beneficiary) are eligible if the conditions in Article 13.1.1 are met.

**C. Direct costs of providing financial support to third parties**

Not applicable

**D. Other direct costs**

**D.1 Travel costs and related subsistence allowances** (including related duties, taxes and charges such as non-deductible value added tax (VAT) paid by the beneficiary) are eligible if they are in line with the beneficiary's usual practices on travel.

**D.2 The depreciation costs of equipment, infrastructure or other assets** (new or second-hand) as recorded in the beneficiary's accounts are eligible, if they were purchased in accordance with

Article 10.1.1 and written off in accordance with international accounting standards and the beneficiary's usual accounting practices.

The **costs of renting or leasing** equipment, infrastructure or other assets (including related duties, taxes and charges such as non-deductible value added tax (VAT) paid by the beneficiary) are also eligible, if they do not exceed the depreciation costs of similar equipment, infrastructure or assets and do not include any financing fees.

The costs of equipment, infrastructure or other assets **contributed in-kind against payment** are eligible, if they do not exceed the depreciation costs of similar equipment, infrastructure or assets, do not include any financing fees and if the conditions in Article 11.1 are met.

The only portion of the costs that will be taken into account is that which corresponds to the duration of the action and rate of actual use for the purposes of the action.

**D.3 Costs of other goods and services** (including related duties, taxes and charges such as non-deductible value added tax (VAT) paid by the beneficiary) are eligible, if they are:

- (a) purchased specifically for the action and in accordance with Article 10.1.1 or
- (b) contributed in kind against payment and in accordance with Article 11.1.

Such goods and services include, for instance, consumables and supplies, dissemination (including open access), protection of results, certificates on the financial statements (if they are required by the Agreement), certificates on the methodology, translations and publications.

**D.4 Capitalised and operating costs of 'large research infrastructure'**<sup>2</sup> directly used for the action are eligible, if:

- (a) the value of the large research infrastructure represents at least 75% of the total fixed assets (at historical value in its last closed balance sheet before the date of the signature of the Agreement or as determined on the basis of the rental and leasing costs of the research infrastructure<sup>3</sup>);
- (b) the beneficiary's methodology for declaring the costs for large research infrastructure has been positively assessed by the Commission ('**ex-ante assessment**');
- (c) the beneficiary declares as direct eligible costs only the portion which corresponds to the duration of the action and the rate of actual use for the purposes of the action, and
- (d) they comply with the conditions as further detailed in the annotations to the H2020 grant agreements.

<sup>2</sup> '**Large research infrastructure**' means research infrastructure of a total value of at least EUR 20 million, for a beneficiary, calculated as the sum of historical asset values of each individual research infrastructure of that beneficiary, as they appear in its last closed balance sheet before the date of the signature of the Agreement or as determined on the basis of the rental and leasing costs of the research infrastructure.

<sup>3</sup> For the definition, see Article 2(6) of the H2020 Framework Programme Regulation No 1291/2013: '**Research infrastructure**' are facilities, resources and services that are used by the research communities to conduct research and foster innovation in their fields. Where relevant, they may be used beyond research, e.g. for education or public services. They include: major scientific equipment (or sets of instruments); knowledge-based resources such as collections, archives or scientific data; e-infrastructures such as data and computing systems and communication networks; and any other infrastructure of a unique nature essential to achieve excellence in research and innovation. Such infrastructures may be 'single-sited', 'virtual' or 'distributed'.

#### D.5 Costs of internally invoiced goods and services directly used for the action are eligible, if:

- (a) they are declared on the basis of a unit cost calculated in accordance with the beneficiary's usual cost accounting practices;
- (b) the cost accounting practices used are applied in a consistent manner, based on objective criteria, regardless of the source of funding;
- (c) the unit cost is calculated using the actual costs for the good or service recorded in the beneficiary's accounts, excluding any ineligible cost or costs included in other budget categories.

The actual costs may be adjusted by the beneficiary on the basis of budgeted or estimated elements. Those elements must be relevant for calculating the costs, reasonable and correspond to objective and verifiable information;

- (d) the unit cost excludes any costs of items which are not directly linked to the production of the invoiced goods or service.

'Internally invoiced goods and services' means goods or services which are provided by the beneficiary directly for the action and which the beneficiary values on the basis of its usual cost accounting practices.

#### E. Indirect costs

**Indirect costs** are eligible if they are declared on the basis of the flat-rate of 25% of the eligible direct costs (see Article 5.2 and Points A to D above), from which are excluded:

- (a) costs of subcontracting and
- (b) costs of in-kind contributions provided by third parties which are not used on the beneficiary's premises;
- (c) not applicable;
- (d) not applicable.

Beneficiaries receiving an operating grant<sup>4</sup> financed by the EU or Euratom budget cannot declare indirect costs for the period covered by the operating grant, unless they can demonstrate that the operating grant does not cover any costs of the action.

#### F. Specific cost category(ies)

Not applicable

### 6.3 Conditions for costs of linked third parties to be eligible

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<sup>4</sup> For the definition, see Article 121(1)(b) of Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council of 25 October 2012 on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC, Euratom) No 1605/2002 ('**Financial Regulation No 966/2012**') (OJ L 218, 26.10.2012, p.1): '**operating grant**' means direct financial contribution, by way of donation, from the budget in order to finance the functioning of a body which pursues an aim of general EU interest or has an objective forming part of and supporting an EU policy.



**Costs incurred by linked third parties** are eligible if they fulfil — *mutatis mutandis* — the general and specific conditions for eligibility set out in this Article (Article 6.1 and 6.2) and Article 14.1.1.

#### **6.4 Conditions for in-kind contributions provided by third parties free of charge to be eligible**

**In-kind contributions provided free of charge** are eligible direct costs (for the beneficiary or linked third party), if the costs incurred by the third party fulfil — *mutatis mutandis* — the general and specific conditions for eligibility set out in this Article (Article 6.1 and 6.2) and Article 12.1.

#### **6.5 Ineligible costs**

‘**Ineligible costs**’ are:

(a) costs that do not comply with the conditions set out above (Article 6.1 to 6.4), in particular:

- (i) costs related to return on capital;
- (ii) debt and debt service charges;
- (iii) provisions for future losses or debts;
- (iv) interest owed;
- (v) doubtful debts;
- (vi) currency exchange losses;
- (vii) bank costs charged by the beneficiary’s bank for transfers from the Agency;
- (viii) excessive or reckless expenditure;
- (ix) deductible VAT;
- (x) costs incurred during suspension of the implementation of the action (see Article 49);

(b) costs declared under another EU or Euratom grant (including grants awarded by a Member State and financed by the EU or Euratom budget and grants awarded by bodies other than the Agency for the purpose of implementing the EU or Euratom budget); in particular, indirect costs if the beneficiary is already receiving an operating grant financed by the EU or Euratom budget in the same period, unless it can demonstrate that the operating grant does not cover any costs of the action.

#### **6.6 Consequences of declaration of ineligible costs**

Declared costs that are ineligible will be rejected (see Article 42).

This may also lead to any of the other measures described in Chapter 6.

### **CHAPTER 4 RIGHTS AND OBLIGATIONS OF THE PARTIES**



## **SECTION 1 RIGHTS AND OBLIGATIONS RELATED TO IMPLEMENTING THE ACTION**

### **ARTICLE 7 — GENERAL OBLIGATION TO PROPERLY IMPLEMENT THE ACTION**

#### **7.1 General obligation to properly implement the action**

The beneficiaries must implement the action as described in Annex 1 and in compliance with the provisions of the Agreement and all legal obligations under applicable EU, international and national law.

#### **7.2 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

### **ARTICLE 8 — RESOURCES TO IMPLEMENT THE ACTION — THIRD PARTIES INVOLVED IN THE ACTION**

The beneficiaries must have the appropriate resources to implement the action.

If it is necessary to implement the action, the beneficiaries may:

- purchase goods, works and services (see Article 10);
- use in-kind contributions provided by third parties against payment (see Article 11);
- use in-kind contributions provided by third parties free of charge (see Article 12);
- call upon subcontractors to implement action tasks described in Annex 1 (see Article 13);
- call upon linked third parties to implement action tasks described in Annex 1 (see Article 14);
- call upon international partners to implement action tasks described in Annex 1 (see Article 14a).

In these cases, the beneficiaries retain sole responsibility towards the Agency and the other beneficiaries for implementing the action.

### **ARTICLE 9 — IMPLEMENTATION OF ACTION TASKS BY BENEFICIARIES NOT RECEIVING EU FUNDING**

Not applicable

### **ARTICLE 10 — PURCHASE OF GOODS, WORKS OR SERVICES**

#### **10.1 Rules for purchasing goods, works or services**

10.1.1 If necessary to implement the action, the beneficiaries may purchase goods, works or services.

The beneficiaries must make such purchases ensuring the best value for money or, if appropriate, the lowest price. In doing so, they must avoid any conflict of interests (see Article 35).

The beneficiaries must ensure that the Agency, the Commission, the European Court of Auditors (ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards their contractors.

10.1.2 Beneficiaries that are ‘contracting authorities’ within the meaning of Directive 2004/18/EC<sup>5</sup> (or 2014/24/EU<sup>6</sup>) or ‘contracting entities’ within the meaning of Directive 2004/17/EC<sup>7</sup> (or 2014/25/EU<sup>8</sup>) must comply with the applicable national law on public procurement.

## **10.2 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under Article 10.1.1, the costs related to the contract concerned will be ineligible (see Article 6) and will be rejected (see Article 42).

If a beneficiary breaches any of its obligations under Article 10.1.2, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

## **ARTICLE 11 — USE OF IN-KIND CONTRIBUTIONS PROVIDED BY THIRD PARTIES AGAINST PAYMENT**

### **11.1 Rules for the use of in-kind contributions against payment**

If necessary to implement the action, the beneficiaries may use in-kind contributions provided by third parties against payment.

The beneficiaries may declare costs related to the payment of in-kind contributions as eligible (see Article 6.1 and 6.2), up to the third parties’ costs for the seconded persons, contributed equipment, infrastructure or other assets or other contributed goods and services.

The third parties and their contributions must be set out in Annex 1. The Agency may however approve in-kind contributions not set out in Annex 1 without amendment (see Article 55), if:

- they are specifically justified in the periodic technical report and
- their use does not entail changes to the Agreement which would call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

The beneficiaries must ensure that the Agency, the Commission, the European Court of Auditors

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<sup>5</sup> Directive 2004/18/EC of the European Parliament and of the Council of 31 March 2004 on the coordination of procedures for the award of public work contracts, public supply contracts and public service contracts (OJ L 134, 30.04.2004, p. 114).

<sup>6</sup> Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC. (OJ L 94, 28.03.2014, p. 65).

<sup>7</sup> Directive 2004/17/EC of the European Parliament and of the Council of 31 March 2004 coordinating the procurement procedures of entities operating in the water, energy, transport and postal services sectors (OJ L 134, 30.04.2004, p. 1)

<sup>8</sup> Directive 2014/25/EU of the European Parliament and of the Council of 26 February 2014 on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC (OJ L 94, 28.03.2014, p. 243).

(ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards the third parties.

## **11.2 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the costs related to the payment of the in-kind contribution will be ineligible (see Article 6) and will be rejected (see Article 42).

Such breaches may also lead to any of the other measures described in Chapter 6.

## **ARTICLE 12 — USE OF IN-KIND CONTRIBUTIONS PROVIDED BY THIRD PARTIES FREE OF CHARGE**

### **12.1 Rules for the use of in-kind contributions free of charge**

If necessary to implement the action, the beneficiaries may use in-kind contributions provided by third parties free of charge.

The beneficiaries may declare costs incurred by the third parties for the seconded persons, contributed equipment, infrastructure or other assets or other contributed goods and services as eligible in accordance with Article 6.4.

The third parties and their contributions must be set out in Annex 1. The Agency may however approve in-kind contributions not set out in Annex 1 without amendment (see Article 55), if:

- they are specifically justified in the periodic technical report and
- their use does not entail changes to the Agreement which would call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

The beneficiaries must ensure that the Agency, the Commission, the European Court of Auditors (ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards the third parties.

### **12.2 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the costs incurred by the third parties related to the in-kind contribution will be ineligible (see Article 6) and will be rejected (see Article 42).

Such breaches may also lead to any of the other measures described in Chapter 6.

## **ARTICLE 13 — IMPLEMENTATION OF ACTION TASKS BY SUBCONTRACTORS**

### **13.1 Rules for subcontracting action tasks**

13.1.1 If necessary to implement the action, the beneficiaries may award subcontracts covering the implementation of certain action tasks described in Annex 1.

Subcontracting may cover only a limited part of the action.

The beneficiaries must award the subcontracts ensuring the best value for money or, if appropriate, the lowest price. In doing so, they must avoid any conflict of interests (see Article 35).

The tasks to be implemented and the estimated cost for each subcontract must be set out in Annex 1 and the total estimated costs of subcontracting per beneficiary must be set out in Annex 2. The Agency may however approve subcontracts not set out in Annex 1 and 2 without amendment (see Article 55), if:

- they are specifically justified in the periodic technical report and
- they do not entail changes to the Agreement which would call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

The beneficiaries must ensure that the Agency, the Commission, the European Court of Auditors (ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards their subcontractors.

13.1.2 The beneficiaries must ensure that their obligations under Articles 35, 36, 38 and 46 also apply to the subcontractors.

Beneficiaries that are ‘contracting authorities’ within the meaning of Directive 2004/18/EC (or 2014/24/EU) or ‘contracting entities’ within the meaning of Directive 2004/17/EC (or 2014/25/EU) must comply with the applicable national law on public procurement.

## 13.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under Article 13.1.1, the costs related to the subcontract concerned will be ineligible (see Article 6) and will be rejected (see Article 42).

If a beneficiary breaches any of its obligations under Article 13.1.2, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

## ARTICLE 14 — IMPLEMENTATION OF ACTION TASKS BY LINKED THIRD PARTIES

### 14.1 Rules for calling upon linked third parties to implement part of the action

14.1.1 The following **affiliated entities**<sup>10</sup> and **third parties with a legal link to a beneficiary**<sup>11</sup> (**‘linked third parties’**) may implement the action tasks attributed to them in Annex 1:

<sup>10</sup> For the definition see Article 2.1(2) Rules for Participation Regulation No 1290/2013: ‘**affiliated entity**’ means any legal entity that is:

- under the direct or indirect control of a participant, or
- under the same direct or indirect control as the participant, or
- directly or indirectly controlling a participant.

‘Control’ may take any of the following forms:

- (a) the direct or indirect holding of more than 50% of the nominal value of the issued share capital in the legal entity concerned, or of a majority of the voting rights of the shareholders or associates of that entity;
- (b) the direct or indirect holding, in fact or in law, of decision-making powers in the legal entity concerned.

However the following relationships between legal entities shall not in themselves be deemed to constitute controlling relationships:

- (a) the same public investment corporation, institutional investor or venture-capital company has a direct or indirect holding of more than 50% of the nominal value of the issued share capital or a majority of voting rights of the shareholders or associates;
- (b) the legal entities concerned are owned or supervised by the same public body.

- INDRA FACTORIA TECNOLÓGICA SL (IFT), affiliated or linked to INDRA
- FUNDACIÓN PARA LA INVESTIGACIÓN E INNOVACIÓN BIOSANITARIA DE ATENCIÓN PRIMARIA (FIIBAP), affiliated or linked to SERMAS

The linked third parties may declare as eligible the costs they incur for implementing the action tasks in accordance with Article 6.3.

The beneficiaries must ensure that the Agency, the Commission, the European Court of Auditors (ECA) and the European Anti-Fraud Office (OLAF) can exercise their rights under Articles 22 and 23 also towards their linked third parties.

14.1.2 The beneficiaries must ensure that their obligations under Articles 18, 20, 35, 36 and 38 also apply to their linked third parties.

## **14.2 Consequences of non-compliance**

If any obligation under Article 14.1.1 is breached, the costs of the linked third party will be ineligible (see Article 6) and will be rejected (see Article 42).

If any obligation under Article 14.1.2 is breached, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

## **ARTICLE 14a — IMPLEMENTATION OF ACTION TASKS BY INTERNATIONAL PARTNERS**

Not applicable

## **ARTICLE 15 — FINANCIAL SUPPORT TO THIRD PARTIES**

### **15.1 Rules for providing financial support to third parties**

Not applicable

### **15.2 Financial support in the form of prizes**

Not applicable

### **15.3 Consequences of non-compliance**

Not applicable

## **ARTICLE 16 — PROVISION OF TRANS-NATIONAL OR VIRTUAL ACCESS TO RESEARCH INFRASTRUCTURE**

### **16.1 Rules for providing trans-national access to research infrastructure**

Not applicable

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<sup>11</sup> ‘**Third party with a legal link to a beneficiary**’ is any legal entity which has a legal link to the beneficiary implying collaboration that is not limited to the action.

**16.2 Rules for providing virtual access to research infrastructure**

Not applicable

**16.3 Consequences of non-compliance**

Not applicable

## **SECTION 2 RIGHTS AND OBLIGATIONS RELATED TO THE GRANT ADMINISTRATION**

**ARTICLE 17 — GENERAL OBLIGATION TO INFORM****17.1 General obligation to provide information upon request**

The beneficiaries must provide — during implementation of the action or afterwards and in accordance with Article 41.2 — any information requested in order to verify eligibility of the costs, proper implementation of the action and compliance with any other obligation under the Agreement.

**17.2 Obligation to keep information up to date and to inform about events and circumstances likely to affect the Agreement**

Each beneficiary must keep information stored in the Participant Portal Beneficiary Register (via the electronic exchange system; see Article 52) up to date, in particular, its name, address, legal representatives, legal form and organisation type.

Each beneficiary must immediately inform the coordinator — which must immediately inform the Agency and the other beneficiaries — of any of the following:

- (a) **events** which are likely to affect significantly or delay the implementation of the action or the EU's financial interests, in particular:
  - (i) changes in its legal, financial, technical, organisational or ownership situation or those of its linked third parties and
  - (ii) changes in the name, address, legal form, organisation type of its linked third parties;
- (b) **circumstances** affecting:
  - (i) the decision to award the grant or
  - (ii) compliance with requirements under the Agreement.

**17.3 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

**ARTICLE 18 — KEEPING RECORDS — SUPPORTING DOCUMENTATION**

## 18.1 Obligation to keep records and other supporting documentation

The beneficiaries must — for a period of five years after the payment of the balance — keep records and other supporting documentation in order to prove the proper implementation of the action and the costs they declare as eligible.

They must make them available upon request (see Article 17) or in the context of checks, reviews, audits or investigations (see Article 22).

If there are on-going checks, reviews, audits, investigations, litigation or other pursuits of claims under the Agreement (including the extension of findings; see Article 22), the beneficiaries must keep the records and other supporting documentation until the end of these procedures.

The beneficiaries must keep the original documents. Digital and digitalised documents are considered originals if they are authorised by the applicable national law. The Agency may accept non-original documents if it considers that they offer a comparable level of assurance.

### 18.1.1 Records and other supporting documentation on the scientific and technical implementation

The beneficiaries must keep records and other supporting documentation on scientific and technical implementation of the action in line with the accepted standards in the respective field.

### 18.1.2 Records and other documentation to support the costs declared

The beneficiaries must keep the records and documentation supporting the costs declared, in particular the following:

- (a) for **actual costs**: adequate records and other supporting documentation to prove the costs declared, such as contracts, subcontracts, invoices and accounting records. In addition, the beneficiaries' usual cost accounting practices and internal control procedures must enable direct reconciliation between the amounts declared, the amounts recorded in their accounts and the amounts stated in the supporting documentation;
- (b) for **unit costs**: adequate records and other supporting documentation to prove the number of units declared. Beneficiaries do not need to identify the actual eligible costs covered or to keep or provide supporting documentation (such as accounting statements) to prove the amount per unit.

In addition, **for unit costs calculated in accordance with the beneficiary's usual cost accounting practices**, the beneficiaries must keep adequate records and documentation to prove that the cost accounting practices used comply with the conditions set out in Article 6.2.

The beneficiaries and linked third parties may submit to the Commission, for approval, a certificate (drawn up in accordance with Annex 6) stating that their usual cost accounting practices comply with these conditions (**'certificate on the methodology'**). If the certificate is approved, costs declared in line with this methodology will not be challenged subsequently, unless the beneficiaries have concealed information for the purpose of the approval.

- (c) for **flat-rate costs**: adequate records and other supporting documentation to prove the eligibility of the costs to which the flat-rate is applied. The beneficiaries do not need to identify the costs





covered or provide supporting documentation (such as accounting statements) to prove the amount declared at a flat-rate.

In addition, for **personnel costs** (declared as actual costs or on the basis of unit costs), the beneficiaries must keep **time records** for the number of hours declared. The time records must be in writing and approved by the persons working on the action and their supervisors, at least monthly. In the absence of reliable time records of the hours worked on the action, the Agency may accept alternative evidence supporting the number of hours declared, if it considers that it offers an adequate level of assurance.

As an exception, for **persons working exclusively on the action**, there is no need to keep time records, if the beneficiary signs a **declaration** confirming that the persons concerned have worked exclusively on the action.

For costs declared by linked third parties (see Article 14), it is the beneficiary that must keep the originals of the financial statements and the certificates on the financial statements of the linked third parties.

## 18.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, costs insufficiently substantiated will be ineligible (see Article 6) and will be rejected (see Article 42), and the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

## ARTICLE 19 — SUBMISSION OF DELIVERABLES

### 19.1 Obligation to submit deliverables

The coordinator must submit the ‘**deliverables**’ identified in Annex 1, in accordance with the timing and conditions set out in it.

### 19.2 Consequences of non-compliance

If the coordinator breaches any of its obligations under this Article, the Agency may apply any of the measures described in Chapter 6.

## ARTICLE 20 — REPORTING — PAYMENT REQUESTS

### 20.1 Obligation to submit reports

The coordinator must submit to the Agency (see Article 52) the technical and financial reports set out in this Article. These reports include requests for payment and must be drawn up using the forms and templates provided in the electronic exchange system (see Article 52).

### 20.2 Reporting periods

The action is divided into the following ‘**reporting periods**’:

- RP1: from month 1 to month 12
- RP2: from month 13 to month 24



### 20.3 Periodic reports — Requests for interim payments

The coordinator must submit a periodic report within 60 days following the end of each reporting period.

The **periodic report** must include the following:

(a) a **‘periodic technical report’** containing:

- (i) an **explanation of the work carried out** by the beneficiaries;
- (ii) an **overview of the progress** towards the objectives of the action, including milestones and deliverables identified in Annex 1.

This report must include explanations justifying the differences between work expected to be carried out in accordance with Annex 1 and that actually carried out.

The report must detail the exploitation and dissemination of the results and — if required in Annex 1 — an updated **‘plan for the exploitation and dissemination of the results’**.

The report must indicate the communication activities;

- (iii) a **summary** for publication by the Agency;
- (iv) the answers to the **‘questionnaire’**, covering issues related to the action implementation and the economic and societal impact, notably in the context of the Horizon 2020 key performance indicators and the Horizon 2020 monitoring requirements;

(b) a **‘periodic financial report’** containing:

- (i) an **‘individual financial statement’** (see Annex 4) from each beneficiary and from each linked third party, for the reporting period concerned.

The individual financial statement must detail the eligible costs (actual costs, unit costs and flat-rate costs; see Article 6) for each budget category (see Annex 2).

The beneficiaries and linked third parties must declare all eligible costs, even if — for actual costs, unit costs and flat-rate costs — they exceed the amounts indicated in the estimated budget (see Annex 2). Amounts which are not declared in the individual financial statement will not be taken into account by the Agency.

If an individual financial statement is not submitted for a reporting period, it may be included in the periodic financial report for the next reporting period.

The individual financial statements of the last reporting period must also detail the **receipts of the action** (see Article 5.3.3).

Each beneficiary and each linked third party must **certify** that:

- the information provided is full, reliable and true;
- the costs declared are eligible (see Article 6);

- the costs can be substantiated by adequate records and supporting documentation (see Article 18) that will be produced upon request (see Article 17) or in the context of checks, reviews, audits and investigations (see Article 22), and
  - for the last reporting period: that all the receipts have been declared (see Article 5.3.3);
- (ii) an **explanation of the use of resources** and the information on subcontracting (see Article 13) and in-kind contributions provided by third parties (see Articles 11 and 12) from each beneficiary and from each linked third party, for the reporting period concerned;
- (iii) not applicable;
- (iv) a ‘**periodic summary financial statement**’, created automatically by the electronic exchange system, consolidating the individual financial statements for the reporting period concerned and including — except for the last reporting period — the **request for interim payment**.

#### 20.4 Final report — Request for payment of the balance

In addition to the periodic report for the last reporting period, the coordinator must submit the final report within 60 days following the end of the last reporting period.

The **final report** must include the following:

- (a) a ‘**final technical report**’ with a **summary** for publication containing:
- (i) an overview of the results and their exploitation and dissemination;
  - (ii) the conclusions on the action, and
  - (iii) the socio-economic impact of the action;
- (b) a ‘**final financial report**’ containing:
- (i) a ‘**final summary financial statement**’, created automatically by the electronic exchange system, consolidating the individual financial statements for all reporting periods and including the **request for payment of the balance** and
  - (ii) a ‘**certificate on the financial statements**’ (drawn up in accordance with Annex 5) for each beneficiary and for each linked third party, if it requests a total contribution of EUR 325 000 or more, as reimbursement of actual costs and unit costs calculated on the basis of its usual cost accounting practices (see Article 5.2 and Article 6.2).

#### 20.5 Information on cumulative expenditure incurred

Not applicable

#### 20.6 Currency for financial statements and conversion into euro

Financial statements must be drafted in euro.

Beneficiaries and linked third parties with accounting established in a currency other than the euro must convert the costs recorded in their accounts into euro, at the average of the daily exchange rates published in the C series of the *Official Journal of the European Union*, calculated over the corresponding reporting period.

If no daily euro exchange rate is published in the *Official Journal of the European Union* for the currency in question, they must be converted at the average of the monthly accounting rates published on the Commission's website, calculated over the corresponding reporting period.

Beneficiaries and linked third parties with accounting established in euro must convert costs incurred in another currency into euro according to their usual accounting practices.

## 20.7 Language of reports

All reports (technical and financial reports, including financial statements) must be submitted in the language of the Agreement.

## 20.8 Consequences of non-compliance

If the reports submitted do not comply with this Article, the Agency may suspend the payment deadline (see Article 47) and apply any of the other measures described in Chapter 6.

If the coordinator breaches its obligation to submit the reports and if it fails to comply with this obligation within 30 days following a written reminder, the Agency may terminate the Agreement (see Article 50) or apply any of the other measures described in Chapter 6.

# ARTICLE 21 — PAYMENTS AND PAYMENT ARRANGEMENTS

## 21.1 Payments to be made

The following payments will be made to the coordinator:

- one **pre-financing payment**;
- one or more **interim payments**, on the basis of the request(s) for interim payment (see Article 20), and
- one **payment of the balance**, on the basis of the request for payment of the balance (see Article 20).

## 21.2 Pre-financing payment — Amount — Amount retained for the Guarantee Fund

The aim of the pre-financing is to provide the beneficiaries with a float.

It remains the property of the EU until the payment of the balance.

The amount of the pre-financing payment will be EUR **4 796 606.00** (four million seven hundred and ninety six thousand six hundred and six EURO).

The Agency will — except if Article 48 applies — make the pre-financing payment to the coordinator within 30 days, either from the entry into force of the Agreement (see Article 58) or from 10 days before the starting date of the action (see Article 3), whichever is the latest.

An amount of EUR **299 787.88** (two hundred and ninety nine thousand seven hundred and eighty seven EURO and eighty eight eurocents), corresponding to 5% of the maximum grant amount (see Article 5.1), is retained by the Agency from the pre-financing payment and transferred into the ‘**Guarantee Fund**’.

### **21.3 Interim payments — Amount — Calculation**

Interim payments reimburse the eligible costs incurred for the implementation of the action during the corresponding reporting periods.

The Agency will pay to the coordinator the amount due as interim payment within 90 days from receiving the periodic report (see Article 20.3), except if Articles 47 or 48 apply.

Payment is subject to the approval of the periodic report. Its approval does not imply recognition of the compliance, authenticity, completeness or correctness of its content.

The **amount due as interim payment** is calculated by the Agency in the following steps:

Step 1 — Application of the reimbursement rates

Step 2 — Limit to 90% of the maximum grant amount

#### **21.3.1 Step 1 — Application of the reimbursement rates**

The reimbursement rate(s) (see Article 5.2) are applied to the eligible costs (actual costs, unit costs and flat-rate costs; see Article 6) declared by the beneficiaries and the linked third parties (see Article 20) and approved by the Agency (see above) for the concerned reporting period.

#### **21.3.2 Step 2 — Limit to 90% of the maximum grant amount**

The total amount of pre-financing and interim payments must not exceed 90% of the maximum grant amount set out in Article 5.1. The maximum amount for the interim payment will be calculated as follows:

{90% of the maximum grant amount (see Article 5.1)

minus

{pre-financing and previous interim payments} }.

### **21.4 Payment of the balance — Amount — Calculation — Release of the amount retained for the Guarantee Fund**

The payment of the balance reimburses the remaining part of the eligible costs incurred by the beneficiaries for the implementation of the action.

If the total amount of earlier payments is greater than the final grant amount (see Article 5.3), the payment of the balance takes the form of a recovery (see Article 44).

If the total amount of earlier payments is lower than the final grant amount, the Agency will pay the balance within 90 days from receiving the final report (see Article 20.4), except if Articles 47 or 48 apply.

Payment is subject to the approval of the final report. Its approval does not imply recognition of the compliance, authenticity, completeness or correctness of its content.

The **amount due as the balance** is calculated by the Agency by deducting the total amount of pre-financing and interim payments (if any) already made, from the final grant amount determined in accordance with Article 5.3:

$$\begin{aligned} & \{\text{final grant amount (see Article 5.3)} \\ & \text{minus} \\ & \{\text{pre-financing and interim payments (if any) made}\} \}. \end{aligned}$$

At the payment of the balance, the amount retained for the Guarantee Fund (see above) will be released and:

- if the balance is positive: the amount released will be paid in full to the coordinator together with the amount due as the balance;
- if the balance is negative (payment of the balance taking the form of recovery): it will be deducted from the amount released (see Article 44.1.2). If the resulting amount:
  - is positive, it will be paid to the coordinator
  - is negative, it will be recovered.

The amount to be paid may however be offset — without the beneficiaries' consent — against any other amount owed by a beneficiary to the Agency, the Commission or another executive agency (under the EU or Euratom budget), up to the maximum EU contribution indicated, for that beneficiary, in the estimated budget (see Annex 2).

### **21.5 Notification of amounts due**

When making payments, the Agency will formally notify to the coordinator the amount due, specifying whether it concerns an interim payment or the payment of the balance.

For the payment of the balance, the notification will also specify the final grant amount.

In the case of reduction of the grant or recovery of undue amounts, the notification will be preceded by the contradictory procedure set out in Articles 43 and 44.

### **21.6 Currency for payments**

The Agency will make all payments in euro.

### **21.7 Payments to the coordinator — Distribution to the beneficiaries**

Payments will be made to the coordinator.

Payments to the coordinator will discharge the Agency from its payment obligation.

The coordinator must distribute the payments between the beneficiaries without unjustified delay.

Pre-financing may however be distributed only:

- (a) if the minimum number of beneficiaries set out in the call for proposals has acceded to the Agreement (see Article 56) and
- (b) to beneficiaries that have acceded to the Agreement (see Article 56).

## 21.8 Bank account for payments

All payments will be made to the following bank account:

Name of bank: BANCO SANTANDER, S.A.  
 Full name of the account holder: INDRA SYSTEMAS SA  
 IBAN code: ES5700491500042710383419

## 21.9 Costs of payment transfers

The cost of the payment transfers is borne as follows:

- the Agency bears the cost of transfers charged by its bank;
- the beneficiary bears the cost of transfers charged by its bank;
- the party causing a repetition of a transfer bears all costs of the repeated transfer.

## 21.10 Date of payment

Payments by the Agency are considered to have been carried out on the date when they are debited to its account.

## 21.11 Consequences of non-compliance

21.11.1 If the Agency does not pay within the payment deadlines (see above), the beneficiaries are entitled to **late-payment interest** at the rate applied by the European Central Bank (ECB) for its main refinancing operations in euros ('reference rate'), plus three and a half points. The reference rate is the rate in force on the first day of the month in which the payment deadline expires, as published in the C series of the *Official Journal of the European Union*.

If the late-payment interest is lower than or equal to EUR 200, it will be paid to the coordinator only upon request submitted within two months of receiving the late payment.

Late-payment interest is not due if all beneficiaries are EU Member States (including regional and local government authorities or other public bodies acting on behalf of a Member State for the purpose of this Agreement).

Suspension of the payment deadline or payments (see Articles 47 and 48) will not be considered as late payment.

Late-payment interest covers the period running from the day following the due date for payment (see above), up to and including the date of payment.

Late-payment interest is not considered for the purposes of calculating the final grant amount.

21.11.2 If the coordinator breaches any of its obligations under this Article, the grant may be reduced (see Article 43) and the Agreement or the participation of the coordinator may be terminated (see Article 50).

Such breaches may also lead to any of the other measures described in Chapter 6.

## **ARTICLE 22 — CHECKS, REVIEWS, AUDITS AND INVESTIGATIONS — EXTENSION OF FINDINGS**

### **22.1 Checks, reviews and audits by the Agency and the Commission**

#### **22.1.1 Right to carry out checks**

The Agency or the Commission will — during the implementation of the action or afterwards — check the proper implementation of the action and compliance with the obligations under the Agreement, including assessing deliverables and reports.

For this purpose the Agency or the Commission may be assisted by external persons or bodies.

The Agency or the Commission may also request additional information in accordance with Article 17. The Agency or the Commission may request beneficiaries to provide such information to it directly.

Information provided must be accurate, precise and complete and in the format requested, including electronic format.

#### **22.1.2 Right to carry out reviews**

The Agency or the Commission may — during the implementation of the action or afterwards — carry out reviews on the proper implementation of the action (including assessment of deliverables and reports), compliance with the obligations under the Agreement and continued scientific or technological relevance of the action.

Reviews may be started up to two years after the payment of the balance. They will be formally notified to the coordinator or beneficiary concerned and will be considered to have started on the date of the formal notification.

If the review is carried out on a third party (see Articles 10 to 16), the beneficiary concerned must inform the third party.

The Agency or the Commission may carry out reviews directly (using its own staff) or indirectly (using external persons or bodies appointed to do so). It will inform the coordinator or beneficiary concerned of the identity of the external persons or bodies. They have the right to object to the appointment on grounds of commercial confidentiality.

The coordinator or beneficiary concerned must provide — within the deadline requested — any information and data in addition to deliverables and reports already submitted (including information on the use of resources). The Agency or the Commission may request beneficiaries to provide such information to it directly.

The coordinator or beneficiary concerned may be requested to participate in meetings, including with external experts.



For **on-the-spot** reviews, the beneficiaries must allow access to their sites and premises, including to external persons or bodies, and must ensure that information requested is readily available.

Information provided must be accurate, precise and complete and in the format requested, including electronic format.

On the basis of the review findings, a '**review report**' will be drawn up.

The Agency or the Commission will formally notify the review report to the coordinator or beneficiary concerned, which has 30 days to formally notify observations ('**contradictory review procedure**').

Reviews (including review reports) are in the language of the Agreement.

### 22.1.3 Right to carry out audits

The Agency or the Commission may — during the implementation of the action or afterwards — carry out audits on the proper implementation of the action and compliance with the obligations under the Agreement.

Audits may be started up to two years after the payment of the balance. They will be formally notified to the coordinator or beneficiary concerned and will be considered to have started on the date of the formal notification.

If the audit is carried out on a third party (see Articles 10 to 16), the beneficiary concerned must inform the third party.

The Agency or the Commission may carry out audits directly (using its own staff) or indirectly (using external persons or bodies appointed to do so). It will inform the coordinator or beneficiary concerned of the identity of the external persons or bodies. They have the right to object to the appointment on grounds of commercial confidentiality.

The coordinator or beneficiary concerned must provide — within the deadline requested — any information (including complete accounts, individual salary statements or other personal data) to verify compliance with the Agreement. The Agency or the Commission may request beneficiaries to provide such information to it directly.

For **on-the-spot** audits, the beneficiaries must allow access to their sites and premises, including to external persons or bodies, and must ensure that information requested is readily available.

Information provided must be accurate, precise and complete and in the format requested, including electronic format.

On the basis of the audit findings, a '**draft audit report**' will be drawn up.

The Agency or the Commission will formally notify the draft audit report to the coordinator or beneficiary concerned, which has 30 days to formally notify observations ('**contradictory audit procedure**'). This period may be extended by the Agency or the Commission in justified cases.

The '**final audit report**' will take into account observations by the coordinator or beneficiary concerned. The report will be formally notified to it.

Audits (including audit reports) are in the language of the Agreement.



The Agency or the Commission may also access the beneficiaries' statutory records for the periodical assessment of unit costs or flat-rate amounts.

## 22.2 Investigations by the European Anti-Fraud Office (OLAF)

Under Regulations No 883/2013<sup>16</sup> and No 2185/96<sup>17</sup> (and in accordance with their provisions and procedures), the European Anti-Fraud Office (OLAF) may — at any moment during implementation of the action or afterwards — carry out investigations, including on-the-spot checks and inspections, to establish whether there has been fraud, corruption or any other illegal activity affecting the financial interests of the EU.

## 22.3 Checks and audits by the European Court of Auditors (ECA)

Under Article 287 of the Treaty on the Functioning of the European Union (TFEU) and Article 161 of the Financial Regulation No 966/2012<sup>18</sup>, the European Court of Auditors (ECA) may — at any moment during implementation of the action or afterwards — carry out audits.

The ECA has the right of access for the purpose of checks and audits.

## 22.4 Checks, reviews, audits and investigations for international organisations

Not applicable

## 22.5 Consequences of findings in checks, reviews, audits and investigations — Extension of findings

### 22.5.1 Findings in this grant

Findings in checks, reviews, audits or investigations carried out in the context of this grant may lead to the rejection of ineligible costs (see Article 42), reduction of the grant (see Article 43), recovery of undue amounts (see Article 44) or to any of the other measures described in Chapter 6.

Rejection of costs or reduction of the grant after the payment of the balance will lead to a revised final grant amount (see Article 5.4).

Findings in checks, reviews, audits or investigations may lead to a request for amendment for the modification of Annex 1 (see Article 55).

Checks, reviews, audits or investigations that find systemic or recurrent errors, irregularities, fraud or breach of obligations may also lead to consequences in other EU or Euratom grants awarded under similar conditions ('**extension of findings from this grant to other grants**').

<sup>16</sup> Regulation (EU, Euratom) No 883/2013 of the European Parliament and of the Council of 11 September 2013 concerning investigations conducted by the European Anti-Fraud Office (OLAF) and repealing Regulation (EC) No 1073/1999 of the European Parliament and of the Council and Council Regulation (Euratom) No 1074/1999 (OJ L 248, 18.09.2013, p. 1).

<sup>17</sup> Council Regulation (Euratom, EC) No 2185/1996 of 11 November 1996 concerning on-the-spot checks and inspections carried out by the Commission in order to protect the European Communities' financial interests against fraud and other irregularities (OJ L 292, 15.11.1996, p. 2).

<sup>18</sup> Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council of 25 October 2012 on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC, Euratom) No 1605/2002 (OJ L 298, 26.10.2012, p. 1).

Moreover, findings arising from an OLAF investigation may lead to criminal prosecution under national law.

### 22.5.2 Findings in other grants

The Agency or the Commission may extend findings from other grants to this grant ('**extension of findings from other grants to this grant**'), if:

- (a) the beneficiary concerned is found, in other EU or Euratom grants awarded under similar conditions, to have committed systemic or recurrent errors, irregularities, fraud or breach of obligations that have a material impact on this grant and
- (b) those findings are formally notified to the beneficiary concerned — together with the list of grants affected by the findings — no later than two years after the payment of the balance of this grant.

The extension of findings may lead to the rejection of costs (see Article 42), reduction of the grant (see Article 43), recovery of undue amounts (see Article 44), suspension of payments (see Article 48), suspension of the action implementation (see Article 49) or termination (see Article 50).

### 22.5.3 Procedure

The Agency or the Commission will formally notify the beneficiary concerned the systemic or recurrent errors and its intention to extend these audit findings, together with the list of grants affected.

22.5.3.1 If the findings concern **eligibility of costs**: the formal notification will include:

- (a) an invitation to submit observations on the list of grants affected by the findings;
- (b) the request to submit **revised financial statements** for all grants affected;
- (c) the **correction rate for extrapolation** established by the Agency or the Commission on the basis of the systemic or recurrent errors, to calculate the amounts to be rejected if the beneficiary concerned:
  - (i) considers that the submission of revised financial statements is not possible or practicable or
  - (ii) does not submit revised financial statements.

The beneficiary concerned has 90 days from receiving notification to submit observations, revised financial statements or to propose a duly substantiated **alternative correction method**. This period may be extended by the Agency or the Commission in justified cases.

The Agency or the Commission may then start a rejection procedure in accordance with Article 42, on the basis of:

- the revised financial statements, if approved;
- the proposed alternative correction method, if accepted

or

- the initially notified correction rate for extrapolation, if it does not receive any observations or revised financial statements, does not accept the observations or the proposed alternative correction method or does not approve the revised financial statements.

22.5.3.2 If the findings concern **substantial errors, irregularities or fraud or serious breach of obligations**: the formal notification will include:

- (a) an invitation to submit observations on the list of grants affected by the findings and
- (b) the flat-rate the Agency or the Commission intends to apply according to the principle of proportionality.

The beneficiary concerned has 90 days from receiving notification to submit observations or to propose a duly substantiated alternative flat-rate.

The Agency or the Commission may then start a reduction procedure in accordance with Article 43, on the basis of:

- the proposed alternative flat-rate, if accepted
- or
- the initially notified flat-rate, if it does not receive any observations or does not accept the observations or the proposed alternative flat-rate.

## 22.6 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, any insufficiently substantiated costs will be ineligible (see Article 6) and will be rejected (see Article 42).

Such breaches may also lead to any of the other measures described in Chapter 6.

## ARTICLE 23 — EVALUATION OF THE IMPACT OF THE ACTION

### 23.1 Right to evaluate the impact of the action

The Agency or the Commission may carry out interim and final evaluations of the impact of the action measured against the objective of the EU programme.

Evaluations may be started during implementation of the action and up to five years after the payment of the balance. The evaluation is considered to start on the date of the formal notification to the coordinator or beneficiaries.

The Agency or the Commission may make these evaluations directly (using its own staff) or indirectly (using external bodies or persons it has authorised to do so).

The coordinator or beneficiaries must provide any information relevant to evaluate the impact of the action, including information in electronic format.

### 23.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the Agency may apply the measures described in Chapter 6.

## **SECTION 3 RIGHTS AND OBLIGATIONS RELATED TO BACKGROUND AND RESULTS**

### **SUBSECTION 1 GENERAL**

#### **ARTICLE 23a — MANAGEMENT OF INTELLECTUAL PROPERTY**

##### **23a.1 Obligation to take measures to implement the Commission Recommendation on the management of intellectual property in knowledge transfer activities**

Beneficiaries that are universities or other public research organisations must take measures to implement the principles set out in Points 1 and 2 of the Code of Practice annexed to the Commission Recommendation on the management of intellectual property in knowledge transfer activities<sup>19</sup>.

This does not change the obligations set out in Subsections 2 and 3 of this Section.

The beneficiaries must ensure that researchers and third parties involved in the action are aware of them.

##### **23a.2 Consequences of non-compliance**

If a beneficiary breaches its obligations under this Article, the Agency may apply any of the measures described in Chapter 6.

### **SUBSECTION 2 RIGHTS AND OBLIGATIONS RELATED TO BACKGROUND**

#### **ARTICLE 24 — AGREEMENT ON BACKGROUND**

##### **24.1 Agreement on background**

The beneficiaries must identify and agree (in writing) on the background for the action (**‘agreement on background’**).

**‘Background’** means any data, know-how or information — whatever its form or nature (tangible or intangible), including any rights such as intellectual property rights — that:

- (a) is held by the beneficiaries before they acceded to the Agreement, and
- (b) is needed to implement the action or exploit the results.

##### **24.2 Consequences of non-compliance**

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<sup>19</sup> Commission Recommendation C(2008) 1329 of 10.4.2008 on the management of intellectual property in knowledge transfer activities and the Code of Practice for universities and other public research institutions attached to this recommendation.

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

## **ARTICLE 25 — ACCESS RIGHTS TO BACKGROUND**

### **25.1 Exercise of access rights — Waiving of access rights — No sub-licensing**

To exercise access rights, this must first be requested in writing (**‘request for access’**).

**‘Access rights’** means rights to use results or background under the terms and conditions laid down in this Agreement.

Waivers of access rights are not valid unless in writing.

Unless agreed otherwise, access rights do not include the right to sub-license.

### **25.2 Access rights for other beneficiaries, for implementing their own tasks under the action**

The beneficiaries must give each other access — on a royalty-free basis — to background needed to implement their own tasks under the action, unless the beneficiary that holds the background has — before acceding to the Agreement —:

- (a) informed the other beneficiaries that access to its background is subject to legal restrictions or limits, including those imposed by the rights of third parties (including personnel), or
- (b) agreed with the other beneficiaries that access would not be on a royalty-free basis.

### **25.3 Access rights for other beneficiaries, for exploiting their own results**

The beneficiaries must give each other access — under fair and reasonable conditions — to background needed for exploiting their own results, unless the beneficiary that holds the background has — before acceding to the Agreement — informed the other beneficiaries that access to its background is subject to legal restrictions or limits, including those imposed by the rights of third parties (including personnel).

**‘Fair and reasonable conditions’** means appropriate conditions, including possible financial terms or royalty-free conditions, taking into account the specific circumstances of the request for access, for example the actual or potential value of the results or background to which access is requested and/or the scope, duration or other characteristics of the exploitation envisaged.

Requests for access may be made — unless agreed otherwise — up to one year after the period set out in Article 3.

### **25.4 Access rights for affiliated entities**

Unless otherwise agreed in the consortium agreement, access to background must also be given — under fair and reasonable conditions (see above; Article 25.3) and unless it is subject to legal restrictions or limits, including those imposed by the rights of third parties (including personnel) —

to affiliated entities<sup>20</sup> established in an EU Member State or ‘**associated country**’<sup>21</sup>, if this is needed to exploit the results generated by the beneficiaries to which they are affiliated.

Unless agreed otherwise (see above; Article 25.1), the affiliated entity concerned must make the request directly to the beneficiary that holds the background.

Requests for access may be made — unless agreed otherwise — up to one year after the period set out in Article 3.

### **25.5 Access rights for third parties**

Not applicable

### **25.6 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

## **SUBSECTION 3 RIGHTS AND OBLIGATIONS RELATED TO RESULTS**

### **ARTICLE 26 — OWNERSHIP OF RESULTS**

#### **26.1 Ownership by the beneficiary that generates the results**

Results are owned by the beneficiary that generates them.

‘**Results**’ means any (tangible or intangible) output of the action such as data, knowledge or information — whatever its form or nature, whether it can be protected or not — that is generated in the action, as well as any rights attached to it, including intellectual property rights.

#### **26.2 Joint ownership by several beneficiaries**

Two or more beneficiaries own results jointly if:

- (a) they have jointly generated them and
- (b) it is not possible to:
  - (i) establish the respective contribution of each beneficiary, or
  - (ii) separate them for the purpose of applying for, obtaining or maintaining their protection (see Article 27).

<sup>20</sup> For the definition, see ‘affiliated entity’ footnote (Article 14.1).

<sup>21</sup> For the definition, see Article 2.1(3) of the Rules for Participation Regulation No 1290/2013: ‘**associated country**’ means a third country which is party to an international agreement with the Union, as identified in Article 7 of Horizon 2020 Framework Programme Regulation No 1291/2013. Article 7 sets out the conditions for association of non-EU countries to Horizon 2020.

The joint owners must agree (in writing) on the allocation and terms of exercise of their joint ownership ('**joint ownership agreement**'), to ensure compliance with their obligations under this Agreement.

Unless otherwise agreed in the joint ownership agreement, each joint owner may grant non-exclusive licences to third parties to exploit jointly-owned results (without any right to sub-license), if the other joint owners are given:

- (a) at least 45 days advance notice and
- (b) fair and reasonable compensation.

Once the results have been generated, joint owners may agree (in writing) to apply another regime than joint ownership (such as, for instance, transfer to a single owner (see Article 30) with access rights for the others).

### **26.3 Rights of third parties (including personnel)**

If third parties (including personnel) may claim rights to the results, the beneficiary concerned must ensure that it complies with its obligations under the Agreement.

If a third party generates results, the beneficiary concerned must obtain all necessary rights (transfer, licences or other) from the third party, in order to be able to respect its obligations as if those results were generated by the beneficiary itself.

If obtaining the rights is impossible, the beneficiary must refrain from using the third party to generate the results.

### **26.4 Agency ownership, to protect results**

26.4.1 The Agency may — with the consent of the beneficiary concerned — assume ownership of results to protect them, if a beneficiary intends — up to four years after the period set out in Article 3 — to disseminate its results without protecting them, except in any of the following cases:

- (a) the lack of protection is because protecting the results is not possible, reasonable or justified (given the circumstances);
- (b) the lack of protection is because there is a lack of potential for commercial or industrial exploitation, or
- (c) the beneficiary intends to transfer the results to another beneficiary or third party established in an EU Member State or associated country, which will protect them.

Before the results are disseminated and unless any of the cases above under Points (a), (b) or (c) applies, the beneficiary must formally notify the Agency and at the same time inform it of any reasons for refusing consent. The beneficiary may refuse consent only if it can show that its legitimate interests would suffer significant harm.

If the Agency decides to assume ownership, it will formally notify the beneficiary concerned within 45 days of receiving notification.

No dissemination relating to these results may take place before the end of this period or, if the Agency takes a positive decision, until it has taken the necessary steps to protect the results.



26.4.2 The Agency may — with the consent of the beneficiary concerned — assume ownership of results to protect them, if a beneficiary intends — up to four years after the period set out in Article 3 — to stop protecting them or not to seek an extension of protection, except in any of the following cases:

- (a) the protection is stopped because of a lack of potential for commercial or industrial exploitation;
- (b) an extension would not be justified given the circumstances.

A beneficiary that intends to stop protecting results or not seek an extension must — unless any of the cases above under Points (a) or (b) applies — formally notify the Agency at least 60 days before the protection lapses or its extension is no longer possible and at the same time inform it of any reasons for refusing consent. The beneficiary may refuse consent only if it can show that its legitimate interests would suffer significant harm.

If the Agency decides to assume ownership, it will formally notify the beneficiary concerned within 45 days of receiving notification.

## **26.5 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to the any of the other measures described in Chapter 6.

## **ARTICLE 27 — PROTECTION OF RESULTS — VISIBILITY OF EU FUNDING**

### **27.1 Obligation to protect the results**

Each beneficiary must examine the possibility of protecting its results and must adequately protect them — for an appropriate period and with appropriate territorial coverage — if:

- (a) the results can reasonably be expected to be commercially or industrially exploited and
- (b) protecting them is possible, reasonable and justified (given the circumstances).

When deciding on protection, the beneficiary must consider its own legitimate interests and the legitimate interests (especially commercial) of the other beneficiaries.

### **27.2 Agency ownership, to protect the results**

If a beneficiary intends not to protect its results, to stop protecting them or not seek an extension of protection, the Agency may — under certain conditions (see Article 26.4) — assume ownership to ensure their (continued) protection.

### **27.3 Information on EU funding**

Applications for protection of results (including patent applications) filed by or on behalf of a beneficiary must — unless the Agency requests or agrees otherwise or unless it is impossible — include the following:

“The project leading to this application has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101020676”.



## 27.4 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such a breach may also lead to any of the other measures described in Chapter 6.

## ARTICLE 28 — EXPLOITATION OF RESULTS

### 28.1 Obligation to exploit the results

Each beneficiary must — up to four years after the period set out in Article 3 — take measures aiming to ensure ‘**exploitation**’ of its results (either directly or indirectly, in particular through transfer or licensing; see Article 30) by:

- (a) using them in further research activities (outside the action);
- (b) developing, creating or marketing a product or process;
- (c) creating and providing a service, or
- (d) using them in standardisation activities.

This does not change the security obligations in Article 37, which still apply.

### 28.2 Results that could contribute to European or international standards — Information on EU funding

If results are incorporated in a standard, the beneficiary concerned must — unless the Agency requests or agrees otherwise or unless it is impossible — ask the standardisation body to include the following statement in (information related to) the standard:

“Results incorporated in this standard received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101020676”.

### 28.3 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced in accordance with Article 43.

Such a breach may also lead to any of the other measures described in Chapter 6.

## ARTICLE 29 — DISSEMINATION OF RESULTS — OPEN ACCESS — VISIBILITY OF EU FUNDING

### 29.1 Obligation to disseminate results

Unless it goes against their legitimate interests, each beneficiary must — as soon as possible — ‘**disseminate**’ its results by disclosing them to the public by appropriate means (other than those resulting from protecting or exploiting the results), including in scientific publications (in any medium).

This does not change the obligation to protect results in Article 27, the confidentiality obligations in Article 36, the security obligations in Article 37 or the obligations to protect personal data in Article 39, all of which still apply.

A beneficiary that intends to disseminate its results must give advance notice to the other beneficiaries of — unless agreed otherwise — at least 45 days, together with sufficient information on the results it will disseminate.

Any other beneficiary may object within — unless agreed otherwise — 30 days of receiving notification, if it can show that its legitimate interests in relation to the results or background would be significantly harmed. In such cases, the dissemination may not take place unless appropriate steps are taken to safeguard these legitimate interests.

If a beneficiary intends not to protect its results, it may — under certain conditions (see Article 26.4.1) — need to formally notify the Agency before dissemination takes place.

## **29.2 Open access to scientific publications**

Each beneficiary must ensure open access (free of charge online access for any user) to all peer-reviewed scientific publications relating to its results.

In particular, it must:

- (a) as soon as possible and at the latest on publication, deposit a machine-readable electronic copy of the published version or final peer-reviewed manuscript accepted for publication in a repository for scientific publications;

Moreover, the beneficiary must aim to deposit at the same time the research data needed to validate the results presented in the deposited scientific publications.

- (b) ensure open access to the deposited publication — via the repository — at the latest:
  - (i) on publication, if an electronic version is available for free via the publisher, or
  - (ii) within six months of publication (twelve months for publications in the social sciences and humanities) in any other case.
- (c) ensure open access — via the repository — to the bibliographic metadata that identify the deposited publication.

The bibliographic metadata must be in a standard format and must include all of the following:

- the terms “European Union (EU)” and “Horizon 2020”;
- the name of the action, acronym and grant number;
- the publication date, and length of embargo period if applicable, and
- a persistent identifier.

## **29.3 Open access to research data**

Regarding the digital research data generated in the action (**‘data’**), the beneficiaries must:

- (a) deposit in a research data repository and take measures to make it possible for third parties to access, mine, exploit, reproduce and disseminate — free of charge for any user — the following:
  - (i) the data, including associated metadata, needed to validate the results presented in scientific publications, as soon as possible;
  - (ii) not applicable;
  - (iii) other data, including associated metadata, as specified and within the deadlines laid down in the ‘data management plan’ (see Annex 1);
- (b) provide information — via the repository — about tools and instruments at the disposal of the beneficiaries and necessary for validating the results (and — where possible — provide the tools and instruments themselves).

This does not change the obligation to protect results in Article 27, the confidentiality obligations in Article 36, the security obligations in Article 37 or the obligations to protect personal data in Article 39, all of which still apply.

As an exception, the beneficiaries do not have to ensure open access to specific parts of their research data under Point (a)(i) and (iii), if the achievement of the action's main objective (as described in Annex 1) would be jeopardised by making those specific parts of the research data openly accessible. In this case, the data management plan must contain the reasons for not giving access.

#### **29.4 Information on EU funding — Obligation and right to use the EU emblem**

Unless the Agency requests or agrees otherwise or unless it is impossible, any dissemination of results (in any form, including electronic) must:

- (a) display the EU emblem and
- (b) include the following text:

“This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101020676”.

When displayed together with another logo, the EU emblem must have appropriate prominence.

For the purposes of their obligations under this Article, the beneficiaries may use the EU emblem without first obtaining approval from the Agency.

This does not however give them the right to exclusive use.

Moreover, they may not appropriate the EU emblem or any similar trademark or logo, either by registration or by any other means.

#### **29.5 Disclaimer excluding Agency responsibility**

Any dissemination of results must indicate that it reflects only the author's view and that the Agency is not responsible for any use that may be made of the information it contains.

#### **29.6 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such a breach may also lead to any of the other measures described in Chapter 6.

## **ARTICLE 30 — TRANSFER AND LICENSING OF RESULTS**

### **30.1 Transfer of ownership**

Each beneficiary may transfer ownership of its results.

It must however ensure that its obligations under Articles 26.2, 26.4, 27, 28, 29, 30 and 31 also apply to the new owner and that this owner has the obligation to pass them on in any subsequent transfer.

This does not change the security obligations in Article 37, which still apply.

Unless agreed otherwise (in writing) for specifically-identified third parties or unless impossible under applicable EU and national laws on mergers and acquisitions, a beneficiary that intends to transfer ownership of results must give at least 45 days advance notice (or less if agreed in writing) to the other beneficiaries that still have (or still may request) access rights to the results. This notification must include sufficient information on the new owner to enable any beneficiary concerned to assess the effects on its access rights.

Unless agreed otherwise (in writing) for specifically-identified third parties, any other beneficiary may object within 30 days of receiving notification (or less if agreed in writing), if it can show that the transfer would adversely affect its access rights. In this case, the transfer may not take place until agreement has been reached between the beneficiaries concerned.

### **30.2 Granting licenses**

Each beneficiary may grant licences to its results (or otherwise give the right to exploit them), if:

- (a) this does not impede the access rights under Article 31 and
- (b) not applicable.

In addition to Points (a) and (b), exclusive licences for results may be granted only if all the other beneficiaries concerned have waived their access rights (see Article 31.1).

This does not change the dissemination obligations in Article 29 or security obligations in Article 37, which still apply.

### **30.3 Agency right to object to transfers or licensing**

The Agency may — up to four years after the period set out in Article 3 — object to a transfer of ownership or the exclusive licensing of results, if:

- (a) it is to a third party established in a non-EU country not associated with Horizon 2020 and
- (b) the Agency considers that the transfer or licence is not in line with EU interests regarding competitiveness or is inconsistent with ethical principles or security considerations.

A beneficiary that intends to transfer ownership or grant an exclusive licence must formally notify the Agency before the intended transfer or licensing takes place and:

- identify the specific results concerned;
- describe in detail the new owner or licensee and the planned or potential exploitation of the results, and
- include a reasoned assessment of the likely impact of the transfer or licence on EU competitiveness and its consistency with ethical principles and security considerations.

The Agency may request additional information.

If the Agency decides to object to a transfer or exclusive licence, it must formally notify the beneficiary concerned within 60 days of receiving notification (or any additional information it has requested).

No transfer or licensing may take place in the following cases:

- pending the Agency decision, within the period set out above;
- if the Agency objects;
- until the conditions are complied with, if the Agency objection comes with conditions.

### **30.4 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such a breach may also lead to any of the other measures described in Chapter 6.

## **ARTICLE 31 — ACCESS RIGHTS TO RESULTS**

### **31.1 Exercise of access rights — Waiving of access rights — No sub-licensing**

The conditions set out in Article 25.1 apply.

The obligations set out in this Article do not change the security obligations in Article 37, which still apply.

### **31.2 Access rights for other beneficiaries, for implementing their own tasks under the action**

The beneficiaries must give each other access — on a royalty-free basis — to results needed for implementing their own tasks under the action.

### **31.3 Access rights for other beneficiaries, for exploiting their own results**

The beneficiaries must give each other — under fair and reasonable conditions (see Article 25.3) — access to results needed for exploiting their own results.

Requests for access may be made — unless agreed otherwise — up to one year after the period set out in Article 3.

### **31.4 Access rights of affiliated entities**

Unless agreed otherwise in the consortium agreement, access to results must also be given — under fair and reasonable conditions (Article 25.3) — to affiliated entities established in an EU Member State or associated country, if this is needed for those entities to exploit the results generated by the beneficiaries to which they are affiliated.

Unless agreed otherwise (see above; Article 31.1), the affiliated entity concerned must make any such request directly to the beneficiary that owns the results.

Requests for access may be made — unless agreed otherwise — up to one year after the period set out in Article 3.

### **31.5 Access rights for the EU institutions, bodies, offices or agencies and EU Member States**

The beneficiaries must give access to their results — on a royalty-free basis — to EU institutions, bodies, offices and agencies as well as EU Member States' national authorities, necessary for developing, implementing or monitoring their policies or programmes in this area.

Such access rights are limited to non-commercial and non-competitive use.

Access is conditional on an agreement to define specific conditions ensuring that:

- (a) the access will be used only for the intended purpose and
- (b) appropriate confidentiality obligations are in place.

The requesting EU Member State or EU institution, body, office or agency must inform all other EU Member States of such a request.

This does not change the security obligations in Article 37, which still apply.

### **31.6 Access rights for third parties**

Not applicable

### **31.7 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

## **SECTION 4 OTHER RIGHTS AND OBLIGATIONS**

### **ARTICLE 32 — RECRUITMENT AND WORKING CONDITIONS FOR RESEARCHERS**

#### **32.1 Obligation to take measures to implement the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers**

The beneficiaries must take all measures to implement the principles set out in the Commission

Recommendation on the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers<sup>23</sup>, in particular regarding:

- working conditions;
- transparent recruitment processes based on merit, and
- career development.

The beneficiaries must ensure that researchers and third parties involved in the action are aware of them.

## **32.2 Consequences of non-compliance**

If a beneficiary breaches its obligations under this Article, the Agency may apply any of the measures described in Chapter 6.

## **ARTICLE 33 — GENDER EQUALITY**

### **33.1 Obligation to aim for gender equality**

The beneficiaries must take all measures to promote equal opportunities between men and women in the implementation of the action. They must aim, to the extent possible, for a gender balance at all levels of personnel assigned to the action, including at supervisory and managerial level.

### **33.2 Consequences of non-compliance**

If a beneficiary breaches its obligations under this Article, the Agency may apply any of the measures described in Chapter 6.

## **ARTICLE 34 — ETHICS AND RESEARCH INTEGRITY**

### **34.1 Obligation to comply with ethical and research integrity principles**

The beneficiaries must carry out the action in compliance with:

- (a) ethical principles (including the highest standards of research integrity)
- and
- (b) applicable international, EU and national law.

Funding will not be granted for activities carried out outside the EU if they are prohibited in all Member States or for activities which destroy human embryos (for example, for obtaining stem cells).

The beneficiaries must ensure that the activities under the action have an exclusive focus on civil applications.

The beneficiaries must ensure that the activities under the action do not:

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<sup>23</sup> Commission Recommendation 2005/251/EC of 11 March 2005 on the European Charter for Researchers and on a Code of Conduct for the Recruitment of Researchers (OJ L 75, 22.3.2005, p. 67).

- (a) aim at human cloning for reproductive purposes;
- (b) intend to modify the genetic heritage of human beings which could make such changes heritable (with the exception of research relating to cancer treatment of the gonads, which may be financed), or
- (c) intend to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer.

In addition, the beneficiaries must respect the fundamental principle of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity<sup>24</sup>.

This implies compliance with the following fundamental principles:

- **reliability** in ensuring the quality of research reflected in the design, the methodology, the analysis and the use of resources;
- **honesty** in developing, undertaking, reviewing, reporting and communicating research in a transparent, fair and unbiased way;
- **respect** for colleagues, research participants, society, ecosystems, cultural heritage and the environment;
- **accountability** for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider impacts

and means that beneficiaries must ensure that persons carrying out research tasks follow the good research practices and refrain from the research integrity violations described in this Code.

This does not change the other obligations under this Agreement or obligations under applicable international, EU or national law, all of which still apply.

### 34.2 Activities raising ethical issues

Activities raising ethical issues must comply with the ‘**ethics requirements**’ set out as deliverables in Annex 1.

Before the beginning of an activity raising an ethical issue, each beneficiary must have obtained:

- (a) any ethics committee opinion required under national law and
- (b) any notification or authorisation for activities raising ethical issues required under national and/or European law

needed for implementing the action tasks in question.

The documents must be kept on file and be submitted upon request by the coordinator to the Agency (see Article 52). If they are not in English, they must be submitted together with an English summary, which shows that the action tasks in question are covered and includes the conclusions of the committee or authority concerned (if available).

<sup>24</sup> European Code of Conduct for Research Integrity of ALLEA (All European Academies)  
[http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020-ethics\\_code-of-conduct\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020-ethics_code-of-conduct_en.pdf)



### 34.3 Activities involving human embryos or human embryonic stem cells

Activities involving research on human embryos or human embryonic stem cells may be carried out, in addition to Article 34.1, only if:

- they are set out in Annex 1 or
- the coordinator has obtained explicit approval (in writing) from the Agency (see Article 52).

### 34.4 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43) and the Agreement or participation of the beneficiary may be terminated (see Article 50).

Such breaches may also lead to any of the other measures described in Chapter 6.

## ARTICLE 35 — CONFLICT OF INTERESTS

### 35.1 Obligation to avoid a conflict of interests

The beneficiaries must take all measures to prevent any situation where the impartial and objective implementation of the action is compromised for reasons involving economic interest, political or national affinity, family or emotional ties or any other shared interest (**‘conflict of interests’**).

They must formally notify to the Agency without delay any situation constituting or likely to lead to a conflict of interests and immediately take all the necessary steps to rectify this situation.

The Agency may verify that the measures taken are appropriate and may require additional measures to be taken by a specified deadline.

### 35.2 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43) and the Agreement or participation of the beneficiary may be terminated (see Article 50).

Such breaches may also lead to any of the other measures described in Chapter 6.

## ARTICLE 36 — CONFIDENTIALITY

### 36.1 General obligation to maintain confidentiality

During implementation of the action and for four years after the period set out in Article 3, the parties must keep confidential any data, documents or other material (in any form) that is identified as confidential at the time it is disclosed (**‘confidential information’**).

If a beneficiary requests, the Agency may agree to keep such information confidential for an additional period beyond the initial four years.

If information has been identified as confidential only orally, it will be considered to be confidential only if this is confirmed in writing within 15 days of the oral disclosure.

Unless otherwise agreed between the parties, they may use confidential information only to implement the Agreement.

The beneficiaries may disclose confidential information to their personnel or third parties involved in the action only if they:

- (a) need to know to implement the Agreement and
- (b) are bound by an obligation of confidentiality.

This does not change the security obligations in Article 37, which still apply.

The Agency may disclose confidential information to its staff, other EU institutions and bodies. It may disclose confidential information to third parties, if:

- (a) this is necessary to implement the Agreement or safeguard the EU's financial interests and
- (b) the recipients of the information are bound by an obligation of confidentiality.

Under the conditions set out in Article 4 of the Rules for Participation Regulation No 1290/2013<sup>25</sup>, the Commission must moreover make available information on the results to other EU institutions, bodies, offices or agencies as well as Member States or associated countries.

The confidentiality obligations no longer apply if:

- (a) the disclosing party agrees to release the other party;
- (b) the information was already known by the recipient or is given to him without obligation of confidentiality by a third party that was not bound by any obligation of confidentiality;
- (c) the recipient proves that the information was developed without the use of confidential information;
- (d) the information becomes generally and publicly available, without breaching any confidentiality obligation, or
- (e) the disclosure of the information is required by EU or national law.

## **36.2 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

## **ARTICLE 37 — SECURITY-RELATED OBLIGATIONS**

### **37.1 Results with a security recommendation**

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<sup>25</sup> Regulation (EU) No 1290/2013 of the European Parliament and of the Council of 11 December 2013 laying down the rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" (OJ L 347, 20.12.2013 p.81).

Not applicable

### **37.2 Classified information**

Not applicable

### **37.3 Activities involving dual-use goods or dangerous materials and substances**

Not applicable

### **37.4 Consequences of non-compliance**

Not applicable

## **ARTICLE 38 — PROMOTING THE ACTION — VISIBILITY OF EU FUNDING**

### **38.1 Communication activities by beneficiaries**

#### **38.1.1 Obligation to promote the action and its results**

The beneficiaries must promote the action and its results, by providing targeted information to multiple audiences (including the media and the public) in a strategic and effective manner.

This does not change the dissemination obligations in Article 29, the confidentiality obligations in Article 36 or the security obligations in Article 37, all of which still apply.

Before engaging in a communication activity expected to have a major media impact, the beneficiaries must inform the Agency (see Article 52).

#### **38.1.2 Information on EU funding — Obligation and right to use the EU emblem**

Unless the Agency requests or agrees otherwise or unless it is impossible, any communication activity related to the action (including in electronic form, via social media, etc.) and any infrastructure, equipment and major results funded by the grant must:

(a) display the EU emblem and

(b) include the following text:

For communication activities:

“This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101020676”.

For infrastructure, equipment and major results:

“This *[infrastructure]/[equipment]/[insert type of result]* is part of a project that has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101020676”.

When displayed together with another logo, the EU emblem must have appropriate prominence.

For the purposes of their obligations under this Article, the beneficiaries may use the EU emblem without first obtaining approval from the Agency.

This does not, however, give them the right to exclusive use.

Moreover, they may not appropriate the EU emblem or any similar trademark or logo, either by registration or by any other means.

### 38.1.3 Disclaimer excluding Agency and Commission responsibility

Any communication activity related to the action must indicate that it reflects only the author's view and that the Agency and the Commission are not responsible for any use that may be made of the information it contains.

## 38.2 Communication activities by the Agency and the Commission

### 38.2.1 Right to use beneficiaries' materials, documents or information

The Agency and the Commission may use, for its communication and publicising activities, information relating to the action, documents notably summaries for publication and public deliverables as well as any other material, such as pictures or audio-visual material received from any beneficiary (including in electronic form).

This does not change the confidentiality obligations in Article 36 and the security obligations in Article 37, all of which still apply.

If the Agency's or the Commission's use of these materials, documents or information would risk compromising legitimate interests, the beneficiary concerned may request the Agency or the Commission not to use it (see Article 52).

The right to use a beneficiary's materials, documents and information includes:

- (a) **use for its own purposes** (in particular, making them available to persons working for the Agency, the Commission or any other EU institution, body, office or agency or body or institutions in EU Member States; and copying or reproducing them in whole or in part, in unlimited numbers);
- (b) **distribution to the public** (in particular, publication as hard copies and in electronic or digital format, publication on the internet, as a downloadable or non-downloadable file, broadcasting by any channel, public display or presentation, communicating through press information services, or inclusion in widely accessible databases or indexes);
- (c) **editing or redrafting** for communication and publicising activities (including shortening, summarising, inserting other elements (such as meta-data, legends, other graphic, visual, audio or text elements), extracting parts (e.g. audio or video files), dividing into parts, use in a compilation);
- (d) translation;
- (e) giving **access in response to individual requests** under Regulation No 1049/2001<sup>27</sup>, without the right to reproduce or exploit;

<sup>27</sup> Regulation (EC) No 1049/2001 of the European Parliament and of the Council of 30 May 2001 regarding public access to European Parliament, Council and Commission documents, OJ L 145, 31.5.2001, p. 43.

- (f) **storage** in paper, electronic or other form;
- (g) **archiving**, in line with applicable document-management rules, and
- (h) the right to authorise **third parties** to act on its behalf or sub-license the modes of use set out in Points (b), (c), (d) and (f) to third parties if needed for the communication and publicising activities of the Agency or the Commission.

If the right of use is subject to rights of a third party (including personnel of the beneficiary), the beneficiary must ensure that it complies with its obligations under this Agreement (in particular, by obtaining the necessary approval from the third parties concerned).

Where applicable (and if provided by the beneficiaries), the Agency or the Commission will insert the following information:

“© – [year] – [name of the copyright owner]. All rights reserved. Licensed to the Research Executive Agency (REA) and the European Union (EU) under conditions.”

### 38.3 Consequences of non-compliance

If a beneficiary breaches any of its obligations under this Article, the grant may be reduced (see Article 43).

Such breaches may also lead to any of the other measures described in Chapter 6.

## ARTICLE 39 — PROCESSING OF PERSONAL DATA

### 39.1 Processing of personal data by the Agency and the Commission

Any personal data under the Agreement will be processed by the Agency or the Commission under Regulation No 45/2001<sup>28</sup> and according to the ‘notifications of the processing operations’ to the Data Protection Officer (DPO) of the Agency or the Commission (publicly accessible in the DPO register).

Such data will be processed by the ‘**data controller**’ of the Agency or the Commission for the purposes of implementing, managing and monitoring the Agreement or protecting the financial interests of the EU or Euratom (including checks, reviews, audits and investigations; see Article 22).

The persons whose personal data are processed have the right to access and correct their own personal data. For this purpose, they must send any queries about the processing of their personal data to the data controller, via the contact point indicated in the privacy statement(s) that are published on the Agency and the Commission websites.

They also have the right to have recourse at any time to the European Data Protection Supervisor (EDPS).

### 39.2 Processing of personal data by the beneficiaries

<sup>28</sup> Regulation (EC) No 45/2001 of the European Parliament and of the Council of 18 December 2000 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data (OJ L 8, 12.01.2001, p. 1).

The beneficiaries must process personal data under the Agreement in compliance with applicable EU and national law on data protection (including authorisations or notification requirements).

The beneficiaries may grant their personnel access only to data that is strictly necessary for implementing, managing and monitoring the Agreement.

The beneficiaries must inform the personnel whose personal data are collected and processed by the Agency or the Commission. For this purpose, they must provide them with the privacy statement(s) (see above), before transmitting their data to the Agency or the Commission.

### **39.3 Consequences of non-compliance**

If a beneficiary breaches any of its obligations under Article 39.2, the Agency may apply any of the measures described in Chapter 6.

## **ARTICLE 40 — ASSIGNMENTS OF CLAIMS FOR PAYMENT AGAINST THE AGENCY**

The beneficiaries may not assign any of their claims for payment against the Agency to any third party, except if approved by the Agency on the basis of a reasoned, written request by the coordinator (on behalf of the beneficiary concerned).

If the Agency has not accepted the assignment or the terms of it are not observed, the assignment will have no effect on it.

In no circumstances will an assignment release the beneficiaries from their obligations towards the Agency.

## **CHAPTER 5 DIVISION OF BENEFICIARIES' ROLES AND RESPONSIBILITIES** **— RELATIONSHIP WITH COMPLEMENTARY BENEFICIARIES —** **RELATIONSHIP WITH PARTNERS OF A JOINT ACTION**

### **ARTICLE 41 — DIVISION OF BENEFICIARIES' ROLES AND RESPONSIBILITIES** **— RELATIONSHIP WITH COMPLEMENTARY BENEFICIARIES —** **RELATIONSHIP WITH PARTNERS OF A JOINT ACTION**

#### **41.1 Roles and responsibility towards the Agency**

The beneficiaries have full responsibility for implementing the action and complying with the Agreement.

The beneficiaries are jointly and severally liable for the **technical implementation** of the action as described in Annex 1. If a beneficiary fails to implement its part of the action, the other beneficiaries become responsible for implementing this part (without being entitled to any additional EU funding for doing so), unless the Agency expressly relieves them of this obligation.

The **financial responsibility** of each beneficiary is governed by Article 44.

#### **41.2 Internal division of roles and responsibilities**

The internal roles and responsibilities of the beneficiaries are divided as follows:

**(a) Each beneficiary must:**

- (i) keep information stored in the Participant Portal Beneficiary Register (via the electronic exchange system) up to date (see Article 17);
- (ii) inform the coordinator immediately of any events or circumstances likely to affect significantly or delay the implementation of the action (see Article 17);
- (iii) submit to the coordinator in good time:
  - individual financial statements for itself and its linked third parties and, if required, certificates on the financial statements (see Article 20);
  - the data needed to draw up the technical reports (see Article 20);
  - ethics committee opinions and notifications or authorisations for activities raising ethical issues (see Article 34);
  - any other documents or information required by the Agency or the Commission under the Agreement, unless the Agreement requires the beneficiary to submit this information directly to the Agency or the Commission.

**(b) The coordinator must:**

- (i) monitor that the action is implemented properly (see Article 7);
- (ii) act as the intermediary for all communications between the beneficiaries and the Agency (in particular, providing the Agency with the information described in Article 17), unless the Agreement specifies otherwise;
- (iii) request and review any documents or information required by the Agency and verify their completeness and correctness before passing them on to the Agency;
- (iv) submit the deliverables and reports to the Agency (see Articles 19 and 20);
- (v) ensure that all payments are made to the other beneficiaries without unjustified delay (see Article 21);
- (vi) inform the Agency of the amounts paid to each beneficiary, when required under the Agreement (see Articles 44 and 50) or requested by the Agency.

The coordinator may not delegate or subcontract the above-mentioned tasks to any other beneficiary or third party (including linked third parties).

**41.3 Internal arrangements between beneficiaries — Consortium agreement**

The beneficiaries must have internal arrangements regarding their operation and co-ordination to ensure that the action is implemented properly. These internal arrangements must be set out in a written ‘**consortium agreement**’ between the beneficiaries, which may cover:

- internal organisation of the consortium;
- management of access to the electronic exchange system;



- distribution of EU funding;
- additional rules on rights and obligations related to background and results (including whether access rights remain or not, if a beneficiary is in breach of its obligations) (see Section 3 of Chapter 4);
- settlement of internal disputes;
- liability, indemnification and confidentiality arrangements between the beneficiaries.

The consortium agreement must not contain any provision contrary to the Agreement.

#### **41.4 Relationship with complementary beneficiaries — Collaboration agreement**

Not applicable

#### **41.5 Relationship with partners of a joint action — Coordination agreement**

Not applicable

### **CHAPTER 6 REJECTION OF COSTS — REDUCTION OF THE GRANT — RECOVERY — SANCTIONS — DAMAGES — SUSPENSION — TERMINATION — FORCE MAJEURE**

#### **SECTION 1 REJECTION OF COSTS — REDUCTION OF THE GRANT — RECOVERY — SANCTIONS**

#### **ARTICLE 42 — REJECTION OF INELIGIBLE COSTS**

##### **42.1 Conditions**

The Agency will — after **termination of the participation of a beneficiary**, at the time of an **interim payment, at the payment of the balance or afterwards** — reject any costs which are ineligible (see Article 6), in particular following checks, reviews, audits or investigations (see Article 22).

The rejection may also be based on the **extension of findings from other grants to this grant** (see Article 22.5.2).

##### **42.2 Ineligible costs to be rejected — Calculation — Procedure**

Ineligible costs will be rejected in full.

If the rejection of costs does not lead to a recovery (see Article 44), the Agency will formally notify the coordinator or beneficiary concerned of the rejection of costs, the amounts and the reasons why (if applicable, together with the notification of amounts due; see Article 21.5). The coordinator or beneficiary concerned may — within 30 days of receiving notification — formally notify the Agency of its disagreement and the reasons why.

If the rejection of costs leads to a recovery, the Agency will follow the contradictory procedure with pre-information letter set out in Article 44.



### 42.3 Effects

If the Agency rejects costs at the time of an **interim payment** or **the payment of the balance**, it will deduct them from the total eligible costs declared, for the action, in the periodic or final summary financial statement (see Articles 20.3 and 20.4). It will then calculate the interim payment or payment of the balance as set out in Articles 21.3 or 21.4.

If the Agency rejects costs **after termination of the participation of a beneficiary**, it will deduct them from the costs declared by the beneficiary in the termination report and include the rejection in the calculation after termination (see Article 50.2 and 50.3).

If the Agency — **after an interim payment but before the payment of the balance** — rejects costs declared in a periodic summary financial statement, it will deduct them from the total eligible costs declared, for the action, in the next periodic summary financial statement or in the final summary financial statement. It will then calculate the interim payment or payment of the balance as set out in Articles 21.3 or 21.4.

If the Agency rejects costs **after the payment of the balance**, it will deduct the amount rejected from the total eligible costs declared, by the beneficiary, in the final summary financial statement. It will then calculate the revised final grant amount as set out in Article 5.4.

## ARTICLE 43 — REDUCTION OF THE GRANT

### 43.1 Conditions

The Agency may — **after termination of the participation of a beneficiary, at the payment of the balance or afterwards** — reduce the grant amount (see Article 5.1), if :

- (a) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed:
  - (i) substantial errors, irregularities or fraud or
  - (ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles) or
- (b) a beneficiary (or a natural person who has the power to represent or take decision on its behalf) has committed — in other EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2).

### 43.2 Amount to be reduced — Calculation — Procedure

The amount of the reduction will be proportionate to the seriousness of the errors, irregularities or fraud or breach of obligations.

Before reduction of the grant, the Agency will formally notify a ‘**pre-information letter**’ to the coordinator or beneficiary concerned:

- informing it of its intention to reduce the grant, the amount it intends to reduce and the reasons why and
- inviting it to submit observations within 30 days of receiving notification.

If the Agency does not receive any observations or decides to pursue reduction despite the observations it has received, it will formally notify **confirmation** of the reduction (if applicable, together with the notification of amounts due; see Article 21).

### 43.3 Effects

If the Agency reduces the grant **after termination of the participation of a beneficiary**, it will calculate the reduced grant amount for that beneficiary and then determine the amount due to that beneficiary (see Article 50.2 and 50.3).

If the Agency reduces the grant **at the payment of the balance**, it will calculate the reduced grant amount for the action and then determine the amount due as payment of the balance (see Articles 5.3.4 and 21.4).

If the Agency reduces the grant **after the payment of the balance**, it will calculate the revised final grant amount for the beneficiary concerned (see Article 5.4). If the revised final grant amount for the beneficiary concerned is lower than its share of the final grant amount, the Agency will recover the difference (see Article 44).

## ARTICLE 44 — RECOVERY OF UNDUE AMOUNTS

### 44.1 Amount to be recovered — Calculation — Procedure

The Agency will — after **termination of the participation of a beneficiary, at the payment of the balance or afterwards** — claim back any amount that was paid, but is not due under the Agreement.

Each beneficiary's financial responsibility in case of recovery is limited to its own debt (including undue amounts paid by the Agency for costs declared by its linked third parties), except for the amount retained for the Guarantee Fund (see Article 21.4).

#### 44.1.1 Recovery after termination of a beneficiary's participation

If recovery takes place after termination of a beneficiary's participation (including the coordinator), the Agency will claim back the undue amount from the beneficiary concerned, by formally notifying it a debit note (see Article 50.2 and 50.3). This note will specify the amount to be recovered, the terms and the date for payment.

If payment is not made by the date specified in the debit note, the Agency or the Commission will **recover** the amount:

- by '**offsetting**' it — without the beneficiary's consent — against any amounts owed to the beneficiary concerned by the Agency, the Commission or another executive agency (from the EU or Euratom budget).

In exceptional circumstances, to safeguard the EU's financial interests, the Agency or the Commission may offset before the payment date specified in the debit note;

(b) not applicable;

(c) by **taking legal action** (see Article 57) or by **adopting an enforceable decision** under Article 299 of the Treaty on the Functioning of the EU (TFEU) and Article 79(2) of the Financial Regulation No 966/2012.

If payment is not made by the date specified in the debit note, the amount to be recovered (see above) will be increased by **late-payment interest** at the rate set out in Article 21.11, from the day following the payment date in the debit note, up to and including the date the Agency or the Commission receives full payment of the amount.

Partial payments will be first credited against expenses, charges and late-payment interest and then against the principal.

Bank charges incurred in the recovery process will be borne by the beneficiary, unless Directive 2007/64/EC<sup>29</sup> applies.

#### 44.1.2 Recovery at payment of the balance

If the payment of the balance takes the form of a recovery (see Article 21.4), the Agency will formally notify a '**pre-information letter**' to the coordinator:

- informing it of its intention to recover, the amount due as the balance and the reasons why;
- specifying that it intends to deduct the amount to be recovered from the amount retained for the Guarantee Fund;
- requesting the coordinator to submit a report on the distribution of payments to the beneficiaries within 30 days of receiving notification, and
- inviting the coordinator to submit observations within 30 days of receiving notification.

If no observations are submitted or the Agency decides to pursue recovery despite the observations it has received, it will **confirm recovery** (together with the notification of amounts due; see Article 21.5) and:

- pay the difference between the amount to be recovered and the amount retained for the Guarantee Fund, **if the difference is positive** or
- formally notify to the coordinator a **debit note** for the difference between the amount to be recovered and the amount retained for the Guarantee Fund, **if the difference is negative**. This note will also specify the terms and the date for payment.

If the coordinator does not repay the Agency by the date in the debit note and has not submitted the report on the distribution of payments: the Agency or the Commission will **recover** the amount set out in the debit note from the coordinator (see below).

If the coordinator does not repay the Agency by the date in the debit note, but has submitted the report on the distribution of payments: the Agency will:

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<sup>29</sup> Directive 2007/64/EC of the European Parliament and of the Council of 13 November 2007 on payment services in the internal market amending Directives 97/7/EC, 2002/65/EC, 2005/60/EC and 2006/48/EC and repealing Directive 97/5/EC (OJ L 319, 05.12.2007, p. 1).

(a) identify the beneficiaries for which the amount calculated as follows is negative:

$\{ \{ \{ \text{beneficiary's costs declared in the final summary financial statement and approved by the Agency multiplied by the reimbursement rate set out in Article 5.2 for the beneficiary concerned}$

plus

its linked third parties' costs declared in the final summary financial statement and approved by the Agency multiplied by the reimbursement rate set out in Article 5.2 for each linked third party concerned}

divided by

the EU contribution for the action calculated according to Article 5.3.1}

multiplied by

the final grant amount (see Article 5.3)},

minus

{pre-financing and interim payments received by the beneficiary}}.

(b) formally notify to each beneficiary identified according to point (a) a **debit note** specifying the terms and date for payment. The amount of the debit note is calculated as follows:

{amount calculated according to point (a) for the beneficiary concerned

divided by

the sum of the amounts calculated according to point (a) for all the beneficiaries identified according to point (a)}

multiplied by

the amount set out in the debit note formally notified to the coordinator}.

If payment is not made by the date specified in the debit note, the Agency or the Commission will **recover** the amount:

(a) by **offsetting** it — without the beneficiary's consent — against any amounts owed to the beneficiary concerned by the Agency, the Commission or another executive agency (from the EU or Euratom budget).

In exceptional circumstances, to safeguard the EU's financial interests, the Agency or the Commission may offset before the payment date specified in the debit note;

(b) by **drawing on the Guarantee Fund**. The Agency or the Commission will formally notify the beneficiary concerned the debit note on behalf of the Guarantee Fund and recover the amount:

(i) not applicable;

(ii) by **taking legal action** (see Article 57) or by **adopting an enforceable decision** under Article 299 of the Treaty on the Functioning of the EU (TFEU) and Article 79(2) of the Financial Regulation No 966/2012.

If payment is not made by the date in the debit note, the amount to be recovered (see above) will be increased by **late-payment interest** at the rate set out in Article 21.11, from the day following the

payment date in the debit note, up to and including the date the Agency or the Commission receives full payment of the amount.

Partial payments will be first credited against expenses, charges and late-payment interest and then against the principal.

Bank charges incurred in the recovery process will be borne by the beneficiary, unless Directive 2007/64/EC applies.

#### 44.1.3 Recovery of amounts after payment of the balance

If, for a beneficiary, the revised final grant amount (see Article 5.4) is lower than its share of the final grant amount, it must repay the difference to the Agency.

The beneficiary's share of the final grant amount is calculated as follows:

{ {beneficiary's costs declared in the final summary financial statement and approved by the Agency multiplied by the reimbursement rate set out in Article 5.2 for the beneficiary concerned

plus

its linked third parties' costs declared in the final summary financial statement and approved by the Agency multiplied by the reimbursement rate set out in Article 5.2 for each linked third party concerned}

divided by

the EU contribution for the action calculated according to Article 5.3.1}

multiplied by

the final grant amount (see Article 5.3)}.

If the coordinator has not distributed amounts received (see Article 21.7), the Agency will also recover these amounts.

The Agency will formally notify a **pre-information letter** to the beneficiary concerned:

- informing it of its intention to recover, the due amount and the reasons why and
- inviting it to submit observations within 30 days of receiving notification.

If no observations are submitted or the Agency decides to pursue recovery despite the observations it has received, it will **confirm** the amount to be recovered and formally notify to the beneficiary concerned a **debit note**. This note will also specify the terms and the date for payment.

If payment is not made by the date specified in the debit note, the Agency or the Commission will **recover** the amount:

- (a) by **offsetting** it — without the beneficiary's consent — against any amounts owed to the beneficiary concerned by the Agency, the Commission or another executive agency (from the EU or Euratom budget).

In exceptional circumstances, to safeguard the EU's financial interests, the Agency or the Commission may offset before the payment date specified in the debit note;

(b) by **drawing on the Guarantee Fund**. The Agency or the Commission will formally notify the beneficiary concerned the debit note on behalf of the Guarantee Fund and recover the amount:

- (i) not applicable;
- (ii) by **taking legal action** (see Article 57) or by **adopting an enforceable decision** under Article 299 of the Treaty on the Functioning of the EU (TFEU) and Article 79(2) of the Financial Regulation No 966/2012.

If payment is not made by the date in the debit note, the amount to be recovered (see above) will be increased by **late-payment interest** at the rate set out in Article 21.11, from the day following the date for payment in the debit note, up to and including the date the Agency or the Commission receives full payment of the amount.

Partial payments will be first credited against expenses, charges and late-payment interest and then against the principal.

Bank charges incurred in the recovery process will be borne by the beneficiary, unless Directive 2007/64/EC applies.

## **ARTICLE 45 — ADMINISTRATIVE SANCTIONS**

In addition to contractual measures, the Agency or the Commission may also adopt administrative sanctions under Articles 106 and 131(4) of the Financial Regulation No 966/2012 (i.e. exclusion from future procurement contracts, grants, prizes and expert contracts and/or financial penalties).

## **SECTION 2 LIABILITY FOR DAMAGES**

### **ARTICLE 46 — LIABILITY FOR DAMAGES**

#### **46.1 Liability of the Agency**

The Agency cannot be held liable for any damage caused to the beneficiaries or to third parties as a consequence of implementing the Agreement, including for gross negligence.

The Agency cannot be held liable for any damage caused by any of the beneficiaries or third parties involved in the action, as a consequence of implementing the Agreement.

#### **46.2 Liability of the beneficiaries**

Except in case of force majeure (see Article 51), the beneficiaries must compensate the Agency for any damage it sustains as a result of the implementation of the action or because the action was not implemented in full compliance with the Agreement.

## **SECTION 3 SUSPENSION AND TERMINATION**

### **ARTICLE 47 — SUSPENSION OF PAYMENT DEADLINE**

#### **47.1 Conditions**

The Agency may — at any moment — suspend the payment deadline (see Article 21.2 to 21.4) if a request for payment (see Article 20) cannot be approved because:

- (a) it does not comply with the provisions of the Agreement (see Article 20);
- (b) the technical or financial reports have not been submitted or are not complete or additional information is needed, or
- (c) there is doubt about the eligibility of the costs declared in the financial statements and additional checks, reviews, audits or investigations are necessary.

## 47.2 Procedure

The Agency will formally notify the coordinator of the suspension and the reasons why.

The suspension will **take effect** the day notification is sent by the Agency (see Article 52).

If the conditions for suspending the payment deadline are no longer met, the suspension will be **lifted** — and the remaining period will resume.

If the suspension exceeds two months, the coordinator may request the Agency if the suspension will continue.

If the payment deadline has been suspended due to the non-compliance of the technical or financial reports (see Article 20) and the revised report or statement is not submitted or was submitted but is also rejected, the Agency may also terminate the Agreement or the participation of the beneficiary (see Article 50.3.1(l)).

## ARTICLE 48 — SUSPENSION OF PAYMENTS

### 48.1 Conditions

The Agency may — at any moment — suspend payments, in whole or in part and interim payments or the payment of the balance for one or more beneficiaries, if:

- (a) a beneficiary (or a natural person who has the power to represent or take decision on its behalf) has committed or is suspected of having committed:
  - (i) substantial errors, irregularities or fraud or
  - (ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles) or
- (b) a beneficiary (or a natural person who has the power to represent or take decision on its behalf) has committed — in other EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2).

If payments are suspended for one or more beneficiaries, the Agency will make partial payment(s) for the part(s) not suspended. If suspension concerns the payment of the balance, — once suspension



is lifted — the payment or the recovery of the amount(s) concerned will be considered the payment of the balance that closes the action.

## 48.2 Procedure

Before suspending payments, the Agency will formally notify the coordinator or beneficiary concerned:

- informing it of its intention to suspend payments and the reasons why and
- inviting it to submit observations within 30 days of receiving notification.

If the Agency does not receive observations or decides to pursue the procedure despite the observations it has received, it will formally notify **confirmation** of the suspension. Otherwise, it will formally notify that the suspension procedure is not continued.

The suspension will **take effect** the day the confirmation notification is sent by the Agency.

If the conditions for resuming payments are met, the suspension will be **lifted**. The Agency will formally notify the coordinator or beneficiary concerned.

During the suspension, the periodic report(s) for all reporting periods except the last one (see Article 20.3), must not contain any individual financial statements from the beneficiary concerned and its linked third parties. The coordinator must include them in the next periodic report after the suspension is lifted or — if suspension is not lifted before the end of the action — in the last periodic report.

The beneficiaries may suspend implementation of the action (see Article 49.1) or terminate the Agreement or the participation of the beneficiary concerned (see Article 50.1 and 50.2).

## ARTICLE 49 — SUSPENSION OF THE ACTION IMPLEMENTATION

### 49.1 Suspension of the action implementation, by the beneficiaries

#### 49.1.1 Conditions

The beneficiaries may suspend implementation of the action or any part of it, if exceptional circumstances — in particular *force majeure* (see Article 51) — make implementation impossible or excessively difficult.

#### 49.1.2 Procedure

The coordinator must immediately formally notify to the Agency the suspension (see Article 52), stating:

- the reasons why and
- the expected date of resumption.

The suspension will **take effect** the day this notification is received by the Agency.

Once circumstances allow for implementation to resume, the coordinator must immediately formally



notify the Agency and request an **amendment** of the Agreement to set the date on which the action will be resumed, extend the duration of the action and make other changes necessary to adapt the action to the new situation (see Article 55) — unless the Agreement or the participation of a beneficiary has been terminated (see Article 50).

The suspension will be **lifted** with effect from the resumption date set out in the amendment. This date may be before the date on which the amendment enters into force.

Costs incurred during suspension of the action implementation are not eligible (see Article 6).

## 49.2 Suspension of the action implementation, by the Agency

### 49.2.1 Conditions

The Agency may suspend implementation of the action or any part of it, if:

- (a) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed or is suspected of having committed:
  - (i) substantial errors, irregularities or fraud or
  - (ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles);
- (b) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed — in other EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2), or
- (c) the action is suspected of having lost its scientific or technological relevance.

### 49.2.2 Procedure

Before suspending implementation of the action, the Agency will formally notify the coordinator or beneficiary concerned:

- informing it of its intention to suspend the implementation and the reasons why and
- inviting it to submit observations within 30 days of receiving notification.

If the Agency does not receive observations or decides to pursue the procedure despite the observations it has received, it will formally notify **confirmation** of the suspension. Otherwise, it will formally notify that the procedure is not continued.

The suspension will **take effect** five days after confirmation notification is received (or on a later date specified in the notification).

It will be **lifted** if the conditions for resuming implementation of the action are met.

The coordinator or beneficiary concerned will be formally notified of the lifting and the Agreement will be **amended** to set the date on which the action will be resumed, extend the duration of the action

and make other changes necessary to adapt the action to the new situation (see Article 55) — unless the Agreement has already been terminated (see Article 50).

The suspension will be lifted with effect from the resumption date set out in the amendment. This date may be before the date on which the amendment enters into force.

Costs incurred during suspension are not eligible (see Article 6).

The beneficiaries may not claim damages due to suspension by the Agency (see Article 46).

Suspension of the action implementation does not affect the Agency's right to terminate the Agreement or participation of a beneficiary (see Article 50), reduce the grant or recover amounts unduly paid (see Articles 43 and 44).

## ARTICLE 50 — TERMINATION OF THE AGREEMENT OR OF THE PARTICIPATION OF ONE OR MORE BENEFICIARIES

### 50.1 Termination of the Agreement, by the beneficiaries

#### 50.1.1 Conditions and procedure

The beneficiaries may terminate the Agreement.

The coordinator must formally notify termination to the Agency (see Article 52), stating:

- the reasons why and
- the date the termination will take effect. This date must be after the notification.

If no reasons are given or if the Agency considers the reasons do not justify termination, the Agreement will be considered to have been '**terminated improperly**'.

The termination will **take effect** on the day specified in the notification.

#### 50.1.2 Effects

The coordinator must — within 60 days from when termination takes effect — submit:

- (i) a periodic report (for the open reporting period until termination; see Article 20.3) and
- (ii) the final report (see Article 20.4).

If the Agency does not receive the reports within the deadline (see above), only costs which are included in an approved periodic report will be taken into account.

The Agency will **calculate** the final grant amount (see Article 5.3) and the balance (see Article 21.4) on the basis of the reports submitted. Only costs incurred until termination are eligible (see Article 6). Costs relating to contracts due for execution only after termination are not eligible.

Improper termination may lead to a reduction of the grant (see Article 43).

After termination, the beneficiaries' obligations (in particular Articles 20, 22, 23, Section 3 of Chapter 4, 36, 37, 38, 40, 42, 43 and 44) continue to apply.

## 50.2 Termination of the participation of one or more beneficiaries, by the beneficiaries

### 50.2.1 Conditions and procedure

The participation of one or more beneficiaries may be terminated by the coordinator, on request of the beneficiary concerned or on behalf of the other beneficiaries.

The coordinator must formally notify termination to the Agency (see Article 52) and inform the beneficiary concerned.

If the coordinator's participation is terminated without its agreement, the formal notification must be done by another beneficiary (acting on behalf of the other beneficiaries).

The notification must include:

- the reasons why;
- the opinion of the beneficiary concerned (or proof that this opinion has been requested in writing);
- the date the termination takes effect. This date must be after the notification, and
- a request for amendment (see Article 55), with a proposal for reallocation of the tasks and the estimated budget of the beneficiary concerned (see Annexes 1 and 2) and, if necessary, the addition of one or more new beneficiaries (see Article 56). If termination takes effect after the period set out in Article 3, no request for amendment must be included unless the beneficiary concerned is the coordinator. In this case, the request for amendment must propose a new coordinator.

If this information is not given or if the Agency considers that the reasons do not justify termination, the participation will be considered to have been **terminated improperly**.

The termination will **take effect** on the day specified in the notification.

### 50.2.2 Effects

The coordinator must — within 30 days from when termination takes effect — submit:

- (i) a report on the distribution of payments to the beneficiary concerned and
- (ii) if termination takes effect during the period set out in Article 3, a '**termination report**' from the beneficiary concerned, for the open reporting period until termination, containing an overview of the progress of the work, an overview of the use of resources, the individual financial statement and, if applicable, the certificate on the financial statement (see Articles 20.3 and 20.4).

The information in the termination report must also be included in the periodic report for the next reporting period (see Article 20.3).

If the request for amendment is rejected by the Agency (because it calls into question the decision awarding the grant or breaches the principle of equal treatment of applicants), the Agreement may be terminated according to Article 50.3.1(c).

If the request for amendment is accepted by the Agency, the Agreement is **amended** to introduce the necessary changes (see Article 55).

The Agency will — on the basis of the periodic reports, the termination report and the report on the distribution of payments — **calculate** the amount which is due to the beneficiary and if the (pre-financing and interim) payments received by the beneficiary exceed this amount.

The **amount which is due** is calculated in the following steps:

Step 1 — Application of the reimbursement rate to the eligible costs

The grant amount for the beneficiary is calculated by applying the reimbursement rate(s) to the total eligible costs declared by the beneficiary and its linked third parties in the termination report and approved by the Agency.

Only costs incurred by the beneficiary concerned until termination takes effect are eligible (see Article 6). Costs relating to contracts due for execution only after termination are not eligible.

Step 2 — Reduction due to substantial errors, irregularities or fraud or serious breach of obligations

In case of a reduction (see Article 43), the Agency will calculate the reduced grant amount for the beneficiary by deducting the amount of the reduction (calculated in proportion to the seriousness of the errors, irregularities or fraud or breach of obligations, in accordance with Article 43.2) from the grant amount for the beneficiary.

If the payments received **exceed the amounts due**:

- if termination takes effect during the period set out in Article 3 and the request for amendment is accepted, the beneficiary concerned must repay to the coordinator the amount unduly received. The Agency will formally notify the amount unduly received and request the beneficiary concerned to repay it to the coordinator within 30 days of receiving notification. If it does not repay the coordinator, the Agency will draw upon the Guarantee Fund to pay the coordinator and then notify a **debit note** on behalf of the Guarantee Fund to the beneficiary concerned (see Article 44);
- in all other cases, in particular if termination takes effect after the period set out in Article 3, the Agency will formally notify a **debit note** to the beneficiary concerned. If payment is not made by the date in the debit note, the Guarantee Fund will pay to the Agency the amount due and the Agency will notify a debit note on behalf of the Guarantee Fund to the beneficiary concerned (see Article 44);
- if the beneficiary concerned is the former coordinator, it must repay the new coordinator according to the procedure above, unless:
  - termination takes effect after an interim payment and
  - the former coordinator has not distributed amounts received as pre-financing or interim payments (see Article 21.7).

In this case, the Agency will formally notify a **debit note** to the former coordinator. If payment is not made by the date in the debit note, the Guarantee Fund will pay to the Agency the amount due. The Agency will then pay the new coordinator and notify a debit note on behalf of the Guarantee Fund to the former coordinator (see Article 44).

If the payments received **do not exceed the amounts due**: amounts owed to the beneficiary concerned will be included in the next interim or final payment.

If the Agency does not receive the termination report within the deadline (see above), only costs included in an approved periodic report will be taken into account.

If the Agency does not receive the report on the distribution of payments within the deadline (see above), it will consider that:

- the coordinator did not distribute any payment to the beneficiary concerned and that
- the beneficiary concerned must not repay any amount to the coordinator.

Improper termination may lead to a reduction of the grant (see Article 43) or termination of the Agreement (see Article 50).

After termination, the concerned beneficiary's obligations (in particular Articles 20, 22, 23, Section 3 of Chapter 4, 36, 37, 38, 40, 42, 43 and 44) continue to apply.

### **50.3 Termination of the Agreement or the participation of one or more beneficiaries, by the Agency**

#### **50.3.1 Conditions**

The Agency may terminate the Agreement or the participation of one or more beneficiaries, if:

- (a) one or more beneficiaries do not accede to the Agreement (see Article 56);
- (b) a change to their legal, financial, technical, organisational or ownership situation (or those of its linked third parties) is likely to substantially affect or delay the implementation of the action or calls into question the decision to award the grant;
- (c) following termination of participation for one or more beneficiaries (see above), the necessary changes to the Agreement would call into question the decision awarding the grant or breach the principle of equal treatment of applicants (see Article 55);
- (d) implementation of the action is prevented by force majeure (see Article 51) or suspended by the coordinator (see Article 49.1) and either:
  - (i) resumption is impossible, or
  - (ii) the necessary changes to the Agreement would call into question the decision awarding the grant or breach the principle of equal treatment of applicants;
- (e) a beneficiary is declared bankrupt, being wound up, having its affairs administered by the courts, has entered into an arrangement with creditors, has suspended business activities, or is subject to any other similar proceedings or procedures under national law;

- (f) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has been found guilty of professional misconduct, proven by any means;
- (g) a beneficiary does not comply with the applicable national law on taxes and social security;
- (h) the action has lost scientific or technological relevance;
- (i) not applicable;
- (j) not applicable;
- (k) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed fraud, corruption, or is involved in a criminal organisation, money laundering or any other illegal activity;
- (l) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed:
  - (i) substantial errors, irregularities or fraud or
  - (ii) serious breach of obligations under the Agreement or during the award procedure (including improper implementation of the action, submission of false information, failure to provide required information, breach of ethical principles);
- (m) a beneficiary (or a natural person who has the power to represent or take decisions on its behalf) has committed — in other EU or Euratom grants awarded to it under similar conditions — systemic or recurrent errors, irregularities, fraud or serious breach of obligations that have a material impact on this grant (**extension of findings from other grants to this grant**; see Article 22.5.2);
- (n) despite a specific request by the Agency, a beneficiary does not request — through the coordinator — an amendment to the Agreement to end the participation of one of its linked third parties or international partners that is in one of the situations under points (e), (f), (g), (k), (l) or (m) and to reallocate its tasks.

### 50.3.2 Procedure

Before terminating the Agreement or participation of one or more beneficiaries, the Agency will formally notify the coordinator or beneficiary concerned:

- informing it of its intention to terminate and the reasons why and
- inviting it, within 30 days of receiving notification, to submit observations and — in case of Point (l.ii) above — to inform the Agency of the measures to ensure compliance with the obligations under the Agreement.

If the Agency does not receive observations or decides to pursue the procedure despite the observations it has received, it will formally notify to the coordinator or beneficiary concerned **confirmation** of the termination and the date it will take effect. Otherwise, it will formally notify that the procedure is not continued.

The termination will **take effect**:

- for terminations under Points (b), (c), (e), (g), (h), (j), (l.ii) and (n) above: on the day specified in the notification of the confirmation (see above);
- for terminations under Points (a), (d), (f), (i), (k), (l.i) and (m) above: on the day after the notification of the confirmation is received.

### 50.3.3 Effects

#### (a) for **termination of the Agreement**:

The coordinator must — within 60 days from when termination takes effect — submit:

- (i) a periodic report (for the last open reporting period until termination; see Article 20.3) and
- (ii) a final report (see Article 20.4).

If the Agreement is terminated for breach of the obligation to submit reports (see Articles 20.8 and 50.3.1(l)), the coordinator may not submit any reports after termination.

If the Agency does not receive the reports within the deadline (see above), only costs which are included in an approved periodic report will be taken into account.

The Agency will **calculate** the final grant amount (see Article 5.3) and the balance (see Article 21.4) on the basis of the reports submitted. Only costs incurred until termination takes effect are eligible (see Article 6). Costs relating to contracts due for execution only after termination are not eligible.

This does not affect the Agency's right to reduce the grant (see Article 43) or to impose administrative sanctions (Article 45).

The beneficiaries may not claim damages due to termination by the Agency (see Article 46).

After termination, the beneficiaries' obligations (in particular Articles 20, 22, 23, Section 3 of Chapter 4, 36, 37, 38, 40, 42, 43 and 44) continue to apply.

#### (b) for **termination of the participation of one or more beneficiaries**:

The coordinator must — within 60 days from when termination takes effect — submit:

- (i) a report on the distribution of payments to the beneficiary concerned;
- (ii) a request for amendment (see Article 55), with a proposal for reallocation of the tasks and estimated budget of the beneficiary concerned (see Annexes 1 and 2) and, if necessary, the addition of one or more new beneficiaries (see Article 56). If termination is notified after the period set out in Article 3, no request for amendment must be submitted unless the beneficiary concerned is the coordinator. In this case the request for amendment must propose a new coordinator, and
- (iii) if termination takes effect during the period set out in Article 3, a **termination report** from the beneficiary concerned, for the open reporting period until termination, containing an overview of the progress of the work, an overview of the use of resources,



the individual financial statement and, if applicable, the certificate on the financial statement (see Article 20).

The information in the termination report must also be included in the periodic report for the next reporting period (see Article 20.3).

If the request for amendment is rejected by the Agency (because it calls into question the decision awarding the grant or breaches the principle of equal treatment of applicants), the Agreement may be terminated according to Article 50.3.1(c).

If the request for amendment is accepted by the Agency, the Agreement is **amended** to introduce the necessary changes (see Article 55).

The Agency will — on the basis of the periodic reports, the termination report and the report on the distribution of payments — **calculate** the amount which is due to the beneficiary and if the (pre-financing and interim) payments received by the beneficiary exceed this amount.

The **amount which is due** is calculated in the following steps:

Step 1 — Application of the reimbursement rate to the eligible costs

The grant amount for the beneficiary is calculated by applying the reimbursement rate(s) to the total eligible costs declared by the beneficiary and its linked third parties in the termination report and approved by the Agency.

Only costs incurred by the beneficiary concerned until termination takes effect are eligible (see Article 6). Costs relating to contracts due for execution only after termination are not eligible.

Step 2 — Reduction due to substantial errors, irregularities or fraud or serious breach of obligations

In case of a reduction (see Article 43), the Agency will calculate the reduced grant amount for the beneficiary by deducting the amount of the reduction (calculated in proportion to the seriousness of the errors, irregularities or fraud or breach of obligations, in accordance with Article 43.2) from the grant amount for the beneficiary.

If the payments received **exceed the amounts due**:

- if termination takes effect during the period set out in Article 3 and the request for amendment is accepted, the beneficiary concerned must repay to the coordinator the amount unduly received. The Agency will formally notify the amount unduly received and request the beneficiary concerned to repay it to the coordinator within 30 days of receiving notification. If it does not repay the coordinator, the Agency will draw upon the Guarantee Fund to pay the coordinator and then notify a **debit note** on behalf of the Guarantee Fund to the beneficiary concerned (see Article 44);
- in all other cases, in particular if termination takes effect after the period set out in Article 3, the Agency will formally notify a **debit note** to the beneficiary concerned. If payment is not made by the date in the debit note, the Guarantee Fund will pay to



the Agency the amount due and the Agency will notify a debit note on behalf of the Guarantee Fund to the beneficiary concerned (see Article 44);

- if the beneficiary concerned is the former coordinator, it must repay the new coordinator according to the procedure above, unless:
  - termination takes effect after an interim payment and
  - the former coordinator has not distributed amounts received as pre-financing or interim payments (see Article 21.7).

In this case, the Agency will formally notify a **debit note** to the former coordinator. If payment is not made by the date in the debit note, the Guarantee Fund will pay to the Agency the amount due. The Agency will then pay the new coordinator and notify a debit note on behalf of the Guarantee Fund to the former coordinator (see Article 44).

If the payments received **do not exceed the amounts due**: amounts owed to the beneficiary concerned will be included in the next interim or final payment.

If the Agency does not receive the termination report within the deadline (see above), only costs included in an approved periodic report will be taken into account.

If the Agency does not receive the report on the distribution of payments within the deadline (see above), it will consider that:

- the coordinator did not distribute any payment to the beneficiary concerned and that
- the beneficiary concerned must not repay any amount to the coordinator.

After termination, the concerned beneficiary's obligations (in particular Articles 20, 22, 23, Section 3 of Chapter 4, 36, 37, 38, 40, 42, 43 and 44) continue to apply.

## **SECTION 4 FORCE MAJEURE**

### **ARTICLE 51 — FORCE MAJEURE**

‘Force majeure’ means any situation or event that:

- prevents either party from fulfilling their obligations under the Agreement,
- was unforeseeable, exceptional situation and beyond the parties' control,
- was not due to error or negligence on their part (or on the part of third parties involved in the action), and
- proves to be inevitable in spite of exercising all due diligence.

The following cannot be invoked as force majeure:

- any default of a service, defect in equipment or material or delays in making them available, unless they stem directly from a relevant case of force majeure,

- labour disputes or strikes, or
- financial difficulties.

Any situation constituting force majeure must be formally notified to the other party without delay, stating the nature, likely duration and foreseeable effects.

The parties must immediately take all the necessary steps to limit any damage due to force majeure and do their best to resume implementation of the action as soon as possible.

The party prevented by force majeure from fulfilling its obligations under the Agreement cannot be considered in breach of them.

## **CHAPTER 7 FINAL PROVISIONS**

### **ARTICLE 52 — COMMUNICATION BETWEEN THE PARTIES**

#### **52.1 Form and means of communication**

Communication under the Agreement (information, requests, submissions, ‘formal notifications’, etc.) must:

- be made in writing and
- bear the number of the Agreement.

All communication must be made through the Participant Portal **electronic** exchange system and using the forms and templates provided there.

If — after the payment of the balance — the Agency finds that a formal notification was not accessed, a second formal notification will be made by registered post with proof of delivery (‘formal notification on **paper**’). Deadlines will be calculated from the moment of the second notification.

Communications in the electronic exchange system must be made by persons authorised according to the Participant Portal Terms & Conditions. For naming the authorised persons, each beneficiary must have designated — before the signature of this Agreement — a ‘legal entity appointed representative (LEAR)’. The role and tasks of the LEAR are stipulated in his/her appointment letter (see Participant Portal Terms & Conditions).

If the electronic exchange system is temporarily unavailable, instructions will be given on the Agency and Commission websites.

#### **52.2 Date of communication**

**Communications** are considered to have been made when they are sent by the sending party (i.e. on the date and time they are sent through the electronic exchange system).

**Formal notifications** through the **electronic** exchange system are considered to have been made when they are received by the receiving party (i.e. on the date and time of acceptance by the receiving party, as indicated by the time stamp). A formal notification that has not been accepted within 10 days after sending is considered to have been accepted.

Formal notifications **on paper** sent by **registered post** with proof of delivery (only after the payment of the balance) are considered to have been made on either:

- the delivery date registered by the postal service or
- the deadline for collection at the post office.

If the electronic exchange system is temporarily unavailable, the sending party cannot be considered in breach of its obligation to send a communication within a specified deadline.

### 52.3 Addresses for communication

The **electronic** exchange system must be accessed via the following URL:

<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/myarea/projects>

The Agency will formally notify the coordinator and beneficiaries in advance any changes to this URL.

**Formal notifications on paper** (only after the payment of the balance) addressed **to the Agency** must be sent to the official mailing address indicated on the Agency's website.

Formal notifications on paper (only after the payment of the balance) addressed **to the beneficiaries** must be sent to their legal address as specified in the Participant Portal Beneficiary Register.

## ARTICLE 53 — INTERPRETATION OF THE AGREEMENT

### 53.1 Precedence of the Terms and Conditions over the Annexes

The provisions in the Terms and Conditions of the Agreement take precedence over its Annexes.

Annex 2 takes precedence over Annex 1.

### 53.2 Privileges and immunities

Not applicable

## ARTICLE 54 — CALCULATION OF PERIODS, DATES AND DEADLINES

In accordance with Regulation No 1182/71<sup>30</sup>, periods expressed in days, months or years are calculated from the moment the triggering event occurs.

The day during which that event occurs is not considered as falling within the period.

## ARTICLE 55 — AMENDMENTS TO THE AGREEMENT

### 55.1 Conditions

The Agreement may be amended, unless the amendment entails changes to the Agreement which

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<sup>30</sup> Regulation (EEC, Euratom) No 1182/71 of the Council of 3 June 1971 determining the rules applicable to periods, dates and time-limits (OJ L 124, 8.6.1971, p. 1).

would call into question the decision awarding the grant or breach the principle of equal treatment of applicants.

Amendments may be requested by any of the parties.

## 55.2 Procedure

The party requesting an amendment must submit a request for amendment signed in the electronic exchange system (see Article 52).

The coordinator submits and receives requests for amendment on behalf of the beneficiaries (see Annex 3).

If a change of coordinator is requested without its agreement, the submission must be done by another beneficiary (acting on behalf of the other beneficiaries).

The request for amendment must include:

- the reasons why;
- the appropriate supporting documents, and
- for a change of coordinator without its agreement: the opinion of the coordinator (or proof that this opinion has been requested in writing).

The Agency may request additional information.

If the party receiving the request agrees, it must sign the amendment in the electronic exchange system within 45 days of receiving notification (or any additional information the Agency has requested). If it does not agree, it must formally notify its disagreement within the same deadline. The deadline may be extended, if necessary for the assessment of the request. If no notification is received within the deadline, the request is considered to have been rejected.

An amendment **enters into force** on the day of the signature of the receiving party.

An amendment **takes effect** on the date agreed by the parties or, in the absence of such an agreement, on the date on which the amendment enters into force.

## ARTICLE 56 — ACCESSION TO THE AGREEMENT

### 56.1 Accession of the beneficiaries mentioned in the Preamble

The other beneficiaries must accede to the Agreement by signing the Accession Form (see Annex 3) in the electronic exchange system (see Article 52) within 30 days after its entry into force (see Article 58).

They will assume the rights and obligations under the Agreement with effect from the date of its entry into force (see Article 58).

If a beneficiary does not accede to the Agreement within the above deadline, the coordinator must — within 30 days — request an amendment to make any changes necessary to ensure proper implementation of the action. This does not affect the Agency's right to terminate the Agreement (see Article 50).

## **56.2 Addition of new beneficiaries**

In justified cases, the beneficiaries may request the addition of a new beneficiary.

For this purpose, the coordinator must submit a request for amendment in accordance with Article 55. It must include an Accession Form (see Annex 3) signed by the new beneficiary in the electronic exchange system (see Article 52).

New beneficiaries must assume the rights and obligations under the Agreement with effect from the date of their accession specified in the Accession Form (see Annex 3).

## **ARTICLE 57 — APPLICABLE LAW AND SETTLEMENT OF DISPUTES**

### **57.1 Applicable law**

The Agreement is governed by the applicable EU law, supplemented if necessary by the law of Belgium.

### **57.2 Dispute settlement**

If a dispute concerning the interpretation, application or validity of the Agreement cannot be settled amicably, the General Court — or, on appeal, the Court of Justice of the European Union — has sole jurisdiction. Such actions must be brought under Article 272 of the Treaty on the Functioning of the EU (TFEU).

As an exception, if such a dispute is between the Agency and UNIVERSITETET I SOROST-NORGE, the competent Belgian courts have sole jurisdiction.

If a dispute concerns administrative sanctions, offsetting or an enforceable decision under Article 299 TFEU (see Articles 44, 45 and 46), the beneficiaries must bring action before the General Court — or, on appeal, the Court of Justice of the European Union — under Article 263 TFEU. Actions against offsetting and enforceable decisions must be brought against the Commission (not against the Agency).



## **ARTICLE 58 — ENTRY INTO FORCE OF THE AGREEMENT**

The Agreement will enter into force on the day of signature by the Agency or the coordinator, depending on which is later.

### **SIGNATURES**

For the coordinator

For the Agency



**EUROPEAN COMMISSION**  
Research Executive Agency

**The Director**



## **ANNEX 1 (part A)**

### **Innovation action**

**NUMBER — 101020676 — VALKYRIES**

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# 1.1. The project summary

Project Number <sup>1</sup>	101020676	Project Acronym <sup>2</sup>	VALKYRIES
One form per project			
General information			
Project title <sup>3</sup>	Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters		
Starting date <sup>4</sup>	01/10/2021		
Duration in months <sup>5</sup>	24		
Call (part) identifier <sup>6</sup>	H2020-SU-SEC-2020		
Topic	SU-DRS03-2018-2019-2020 Pre-normative research and demonstration for disaster-resilient societies		
Fixed EC Keywords			
Free keywords			
Abstract <sup>7</sup>			
<p>A methodology for tracking and analysing the needs for standardization and certification harmonization thorough the project life cycle will be defined and enforced, which will allow the early identification of issues related to the conceptualization, design, implementation, integration and deployment of tools for support the EU disaster resiliency; which will be facilitated by a complete consultation strategy to the different stakeholders that are expected to act at each capability development phase, ranging from providers to end users. On these grounds H2020-VALKYRIES will develop, integrate and demonstrate capabilities for enabling immediate and coordinated emergency response including search and rescue, security and health, in scenarios of natural/provoked catastrophes with multiple victims, with special application in cases in which several regions or countries are affected and hence greater interoperability being required. H2020-VALKYRIES will propose both design and development of a modular, interoperable, scalable and secure platform, which will allow the integration between legacy solutions and new technologies. The platform will be able to deploy services and dynamically adapt its behaviour, as the emergency requires it. A series of use cases and demonstrators will be developed placing an emphasis on cross-frontier and cross-sectorial BLOS (Beyond Line of Sight) scenarios, where the usual communications infrastructure could have been damaged, and emergency response teams are deployed without an accurate view of the operation environment</p>			

## 1.2. List of Beneficiaries

 Associated with document Ref. Ares(2021)2406084 - 08/04/2021

Project Number <sup>1</sup>	101020676	Project Acronym <sup>2</sup>	VALKYRIES
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### List of Beneficiaries

No	Name	Short name	Country	Project entry month <sup>8</sup>	Project exit month
1	INDRA SISTEMAS SA	INDRA	Spain	1	24
2	SERVICIO MADRILENO DE SALUD	SERMAS	Spain	1	24
3	TASSICA EMERGENCY TRAINING & RESEARCH SA	TASSICA SA	Spain	1	24
4	ISEM-INSTITUT PRE MEDZINARODNU BEZPECNOST A KRIZOVE RIADENIE, NO	ISEMI	Slovakia	1	24
5	UNIVERSIDAD DE MURCIA	UMU	Spain	1	24
6	SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO S ANNA	SSS	Italy	1	24
7	BLOCKCHAIN2050 BV	BC2050	Netherlands	1	24
8	INSTITUT PO OTBRANA	BDI	Bulgaria	1	24
9	BULGARIAN RED CROSS	BRC	Bulgaria	1	24
10	KENTRO MELETON ASFALEIAS	KEMEA	Greece	1	24
11	HOSPITAL DO ESPIRITO SANTO DE EVORA EPE	HESE	Portugal	1	24
12	ARATOS NTOT NET LTD	ARATOS.NET	Greece	1	24
13	UNIVERSITETET I SOROST-NORGE	USN	Norway	1	24
14	Azienda Regionale Emergenza Urgenza	AREU	Italy	1	24
15	ELLINIKI OMADA DIASOSIS SOMATEIO	HRT	Greece	1	24
16	NOVOTEC CONSULTORES SA	NOVOTEC	Spain	1	24
17	PARTICLE SUMMARY	PARTICLE	Portugal	1	24

## 1.3. Workplan Tables - Detailed Implementation

Associated with document Ref. Ares(2021)2406084 - 08/04/2021

### 1.3.1. WT1 List of work packages

WP Number <sup>9</sup>	WP Title	Lead beneficiary <sup>10</sup>	Person-months <sup>11</sup>	Start month <sup>12</sup>	End month <sup>13</sup>
WP1	Project Management and Communication	1 - INDRA	118.50	1	24
WP2	Design Principles and harmonisation Tactics	16 - NOVOTEC	108.50	1	24
WP3	Responsible innovation, certification and exploitation	6 - SSS	146.00	1	24
WP4	Equipment and ICT enablers for First Aid Responses	5 - UMU	166.00	4	18
WP5	Common Practices, and operational procedures for First Aid Responses	3 - TASSICA SA	126.00	4	18
WP6	Cooperation, Education and Training for First Aid Responses	8 - BDI	111.50	4	18
WP7	Reference Integration, Evaluation and Demonstration	4 - ISEMI	260.00	5	24
WP8	Ethics requirements	1 - INDRA	N/A	1	24
<b>Total</b>			1 036.50		

### 1.3.2. WT2 list of deliverables

Deliverable Number <sup>14</sup>	Deliverable Title	WP number <sup>9</sup>	Lead beneficiary	Type <sup>15</sup>	Dissemination level <sup>16</sup>	Due Date (in months) <sup>17</sup>
D1.1	Periodic Management Report	WP1	1 - INDRA	Report	Confidential, only for members of the consortium (including the Commission Services)	6
D1.2	Financial Statements & Work Report	WP1	1 - INDRA	Report	Confidential, only for members of the consortium (including the Commission Services)	12
D1.3	Data Management Plan	WP1	6 - SSS	ORDP: Open Research Data Pilot	Confidential, only for members of the consortium (including the Commission Services)	6
D1.4	Protocol for Innovators	WP1	6 - SSS	Report	Public	12
D1.5	Data Management Platform	WP1	6 - SSS	Demonstrator	Public	24
D1.6	Ethics and Diversity compliance Report	WP1	6 - SSS	Demonstrator	Public	12
D1.7	Consultation Strategy	WP1	1 - INDRA	Report	Public	1
D1.8	Covid-19 Protocol	WP1	1 - INDRA	Report	Confidential, only for members of the consortium (including the Commission Services)	1
D1.9	Communication and Dissemination Strategy	WP1	1 - INDRA	Report	Public	6
D1.10	Impact Creation Reports	WP1	1 - INDRA	Report	Public	12
D1.11	Dashboard	WP1	1 - INDRA	Demonstrator	Public	18
D2.1	Definition of System Requirements and Demonstration Use Cases	WP2	1 - INDRA	Report	Public	5
D2.2	Terminology and Semantics	WP2	3 - TASSICA SA	Report	Public	6
D2.3	Architecture Design Document	WP2	17 - PARTICLE	Report	Public	7

<b>Deliverable Number<sup>14</sup></b>	<b>Deliverable Title</b>	<b>WP number<sup>9</sup></b>	<b>Lead beneficiary</b>	<b>Type<sup>15</sup></b>	<b>Dissemination level<sup>16</sup></b>	<b>Due Date (in months)<sup>17</sup></b>
D2.4	Map of Standards and joint roadmap	WP2	16 - NOVOTEC	Report	Public	5
D2.5	Harmonization framework	WP2	16 - NOVOTEC	Report	Public	12
D2.6	Harmonization and Standardization Reports	WP2	16 - NOVOTEC	Report	Public	6
D3.1	Report on relevant ethical-legal and societal aspects	WP3	6 - SSS	Report	Public	12
D3.2	Report on the technical, legal, and ethical profiles related to the interoperability of first response capabilities	WP3	1 - INDRA	Report	Public	6
D3.3	Report on data protection and IP boundaries in the applicable framework	WP3	6 - SSS	Report	Public	22
D3.4	Sustainable certification, conformity criteria and evaluation	WP3	13 - USN	Report	Public	6
D3.5	Business Cases	WP3	1 - INDRA	Report	Public	20
D3.6	Exploitation Plan	WP3	1 - INDRA	Report	Public	24
D4.1	Landscape of emerging technological opportunities for first aid response on multi-casualty disasters	WP4	5 - UMU	Report	Public	9
D4.2	Harmonization opportunities on the technological landscape for first aid response on multi-casualty disasters	WP4	5 - UMU	Report	Public	11
D4.3	Roadmap for enhancing the pan-European technological capabilities for first aid response on multi-casualty disasters	WP4	5 - UMU	Report	Public	18
D4.4	VALKYRIES harmonisations on first aid response technologies and equipment	WP4	5 - UMU	Demonstrator	Public	18
D5.1	Landscape of emerging operational	WP5	3 - TASSICA SA	Report	Public	9

<b>Deliverable Number<sup>14</sup></b>	<b>Deliverable Title</b>	<b>WP number<sup>9</sup></b>	<b>Lead beneficiary</b>	<b>Type<sup>15</sup></b>	<b>Dissemination level<sup>16</sup></b>	<b>Due Date (in months)<sup>17</sup></b>
	and procedural opportunities for first aid response on multi-casualty disasters					
D5.2	Harmonization opportunities on the operational and procedural landscape for first aid response on multi-casualty disasters	WP5	3 - TASSICA SA	Report	Public	11
D5.3	Roadmap for enhancing the pan-European operational and procedural capabilities for first aid response on multi-casualty disasters	WP5	3 - TASSICA SA	Report	Public	18
D5.4	VALKYRIES harmonisations on first aid response common practices and procedures	WP5	3 - TASSICA SA	Demonstrator	Public	18
D6.1	Landscape of emerging preparedness and cross-sectorial collaboration opportunities for first aid response on multi-casualty disasters	WP6	8 - BDI	Report	Public	9
D6.2	Harmonization opportunities on the preparedness and cross-sectorial collaboration for first aid response on multi-casualty disasters	WP6	8 - BDI	Report	Public	11
D6.3	Roadmap for enhancing the pan-European preparedness and cross-sectorial collaboration for first aid response on multi-casualty disasters	WP6	8 - BDI	Report	Public	18
D6.4	VALKYRIES harmonisations on first aid preparedness and cross-sectorial collaboration	WP6	8 - BDI	Demonstrator	Public	18
D7.1	Datasets Management and Benchmarking	WP7	10 - KEMEA	Demonstrator	Public	24
D7.2	Testbeds and Evaluation Methodology	WP7	5 - UMU	Demonstrator	Public	10

<b>Deliverable Number<sup>14</sup></b>	<b>Deliverable Title</b>	<b>WP number<sup>9</sup></b>	<b>Lead beneficiary</b>	<b>Type<sup>15</sup></b>	<b>Dissemination level<sup>16</sup></b>	<b>Due Date (in months)<sup>17</sup></b>
D7.3	System Validation and Evaluation	WP7	1 - INDRA	Report	Public	18
D7.4	VALKYRIES Reference Integration and lessons learned	WP7	10 - KEMEA	Report	Public	21
D7.5	Report of the use case: Spain-Portugal	WP7	2 - SERMAS	Demonstrator	Public	24
D7.6	Report of the use case: Slovakia-Austria	WP7	4 - ISEMI	Demonstrator	Public	24
D7.7	Report of the use case: Bulgaria-Greece	WP7	8 - BDI	Demonstrator	Public	24
D7.8	Report of the use case: Norway-Netherlands	WP7	13 - USN	Demonstrator	Public	24
D8.1	H - Requirement No. 1	WP8	1 - INDRA	Ethics	Confidential, only for members of the consortium (including the Commission Services)	6
D8.2	H - Requirement No. 2	WP8	1 - INDRA	Ethics	Confidential, only for members of the consortium (including the Commission Services)	9
D8.3	POPD - Requirement No. 3	WP8	1 - INDRA	Ethics	Confidential, only for members of the consortium (including the Commission Services)	6
D8.4	DU - Requirement No. 4	WP8	1 - INDRA	Ethics	Confidential, only for members of the consortium (including the Commission Services)	9
D8.5	M - Requirement No. 5	WP8	1 - INDRA	Ethics	Confidential, only for members of the consortium (including the Commission Services)	9
D8.6	EPQ - Requirement No. 6	WP8	1 - INDRA	Ethics	Confidential, only for members of the consortium (including the	15

<b>Deliverable Number<sup>14</sup></b>	<b>Deliverable Title</b>	<b>WP number<sup>9</sup></b>	<b>Lead beneficiary</b>	<b>Type<sup>15</sup></b>	<b>Dissemination level<sup>16</sup></b>	<b>Due Date (in months)<sup>17</sup></b>
					Commission Services)	



### 1.3.3. WT3 Work package descriptions

<b>Work package number</b> <sup>9</sup>	WP1	<b>Lead beneficiary</b> <sup>10</sup>	1 - INDRA
<b>Work package title</b>	Project Management and Communication		
<b>Start month</b>	1	<b>End month</b>	24

#### Objectives

Responsible for the operational management and technical vitality of the VALKYRIES project encompassing management components on contractual, financial, legal, technical, administrative, human resources and ethical levels. The main objective is to establish a sound and flexible project management structure and an efficient management process, as well as the provision of an effective risk management strategy to avoid deviations from the work plan. The management of the project work includes decision-making and conflict resolution; administrative and financial management, ethical legal compliance; technical coordination; quality assurance; and data management plan.

#### Description of work and role of partners

##### **WP1 - Project Management and Communication** [Months: 1-24]

**INDRA**, SERMAS, TASSICA SA, ISEMI, UMU, SSS, BC2050, BDI, BRC, KEMEA, HESE, ARATOS.NET, USN, AREU, HRT, NOVOTEC, PARTICLE

All the project activities are supported by coordination actions and communication and exploitations actions. In this WP the following tasks will be carried out:

Task T1.1: Governance and Technical/Scientific Management. Task 1.1 regarding Project Coordination will aim at centralising the control of the project progress by ensuring administrative and contractual relationships within the Consortium. This task entails the coordination of technical progress, through the review and approval of the related reports and deliverables, and resolution of problems of technical and operational nature also in liaison with the H2020 technical programme.

Task T1.2: Quality Assurance, Regulatory Compliance and Diversity Management. This task will embrace the project quality assurance and prompt the H2020 Programme vision; detect and resolve compliance issues by the VALKYRIES Quality Assurance & Risks Manager (QRM); provide a helpdesk regarding compliance questions raised by partners in their tasks; it will maintain an internal FAQ document, which will document these questions and answers; and propose measures to foster diversity in an open and inclusive environment.

Task T1.3: Consultation Strategy and Liaison with European/national authorities. This task will develop a Consultation Strategy and manage the liaisons with National/European authorities. It shall coordinate a large cluster of External Advisory Boards (EAB), Associated Partners and supportive Working Groups that shall join beneficiary partners, end-users, standardisation organisations, etc., through project activities. This task covers all the activities concerning the governance of the external participation, which includes: 1) to define a consultation strategy; 2) to achieve the engagement of external participants;

Task T1.4: Dissemination strategy. The task will cover all the activities related to disseminating the VALKYRIES actionable results to peers and communicate useful information to the broader community.

Task T1.5: Ethical and Legal Compliance Framework. This task will analyse and define the legal, societal and ethical frameworks in which VALKYRIES operates.

#### Participation per Partner

<b>Partner number and short name</b>	<b>WP1 effort</b>
1 - INDRA	18.00
IFT	22.00
2 - SERMAS	0.00
FIIBAP	6.00
3 - TASSICA SA	7.00

Partner number and short name	WP1 effort
4 - ISEMI	4.50
5 - UMU	4.00
6 - SSS	11.00
7 - BC2050	1.00
8 - BDI	5.00
9 - BRC	3.00
10 - KEMEA	6.00
11 - HESE	5.00
12 - ARATOS.NET	1.00
13 - USN	10.00
14 - AREU	4.00
15 - HRT	1.00
16 - NOVOTEC	9.00
17 - PARTICLE	1.00
<b>Total</b>	<b>118.50</b>

#### List of deliverables

Deliverable Number <sup>14</sup>	Deliverable Title	Lead beneficiary	Type <sup>15</sup>	Dissemination level <sup>16</sup>	Due Date (in months) <sup>17</sup>
D1.1	Periodic Management Report	1 - INDRA	Report	Confidential, only for members of the consortium (including the Commission Services)	6
D1.2	Financial Statements & Work Report	1 - INDRA	Report	Confidential, only for members of the consortium (including the Commission Services)	12
D1.3	Data Management Plan	6 - SSS	ORDP: Open Research Data Pilot	Confidential, only for members of the consortium (including the Commission Services)	6
D1.4	Protocol for Innovators	6 - SSS	Report	Public	12
D1.5	Data Management Platform	6 - SSS	Demonstrator	Public	24
D1.6	Ethics and Diversity compliance Report	6 - SSS	Demonstrator	Public	12
D1.7	Consultation Strategy	1 - INDRA	Report	Public	1

### List of deliverables

Deliverable Number <sup>14</sup>	Deliverable Title	Lead beneficiary	Type <sup>15</sup>	Dissemination level <sup>16</sup>	Due Date (in months) <sup>17</sup>
D1.8	Covid-19 Protocol	1 - INDRA	Report	Confidential, only for members of the consortium (including the Commission Services)	1
D1.9	Communication and Dissemination Strategy	1 - INDRA	Report	Public	6
D1.10	Impact Creation Reports	1 - INDRA	Report	Public	12
D1.11	Dashboard	1 - INDRA	Demonstrator	Public	18

### Description of deliverables

The list of deliverables related to this WP is as follows:

- D1.1: Periodic Management Report
- D1.2: Financial Statements & Work Report
- D1.3: Data Management Plan
- D1.4: Protocol for Innovators
- D1.5: Data Management Platform
- D1.6: Ethics and Diversity compliance Report
- D1.7: Consultation Strategy
- D1.8: Covid-19 Protocol
- D1.9: Communication and Dissemination Strategy
- D1.10: Impact Creation Reports
- D1.11: Dashboard

#### D1.1 : Periodic Management Report [6]

They will be submitted at 6-month (M6/M12/18/M24) intervals to regularly inform the Project Officer about the progress of the work and contain an overview of the activities carried out during the reporting period, describes the progress in project objectives, the progress toward the milestones and deliverables set for the period, and any problem found, and corrective actions are taken.

#### D1.2 : Financial Statements & Work Report [12]

This deliverable will detail the justification of the costs incurred and of the resources deployed by each contractor, linking them to activities implemented and justifying their necessity, the financial statements from each contractor (which may require an audit certificate) and a summary financial report consolidating the costs of the contractors. It will be submitted at M12 and M24.

#### D1.3 : Data Management Plan [6]

Describes the data management life cycle for the data to be collected, processed and/or generated within the project. The plan will cover methodology and standards, curation and preservation, but, most importantly, will specify what data will be shared/made open access and why/why not. Results will be guiding reference for all WPs. It will be submitted at M6, M12 and M24.

#### D1.4 : Protocol for Innovators [12]

Considering M1.1 and M1.2. Guidelines will be extracted to generalise and harmonise applications within similar sectors. It will be submitted at M12 and M24.

#### D1.5 : Data Management Platform [24]

It will report on developed guidelines and the VALKYRIES platform that will be developed by offering a SaaS tool to manage in ethically and legally sustainable way information sharing processes with LEA and the public during prevention and incidents. At M24, both Report (R) and Demonstrator (DEM) will be delivered.

#### D1.6 : Ethics and Diversity compliance Report [12]

A report documenting the ethical management processes and any ethical issues experienced during the project, along with how the VALKYRIES project managed and contributed to close the gender gap across all the project activities. It will be submitted at M12 and M24. Both Report (R) and Demonstrator (DEM) will be delivered.

**D1.7 : Consultation Strategy [1]**

Presentation of the Consortium consultation strategy to getting feedback from stakeholders and establishing a longer-term relationship of mutual benefit and trust.

**D1.8 : Covid-19 Protocol [1]**

They will be submitted at 6-month (M1/M6/M12/M18/M24) intervals to regularly inform the Project Officer about the protocol to manage risks related to the Coronavirus crisis, and the effectiveness and lessons learned from the applied prevention, mitigation, and response actions.

**D1.9 : Communication and Dissemination Strategy [6]**

It will report a detailed plan describing the communication of project activities by each partner in the VALKYRIES Consortium, dissemination of project results as well as creating the VALKYRIES website and social media channels in which all material and results will be published online.

**D1.10 : Impact Creation Reports [12]**

These reports will outline the VALKYRIES impact created through dissemination and communication activities, including liaison to other activities. It will be submitted at M12 and M24.

**D1.11 : Dashboard [18]**

Design and development of a dashboard for allowing users and stakeholders to web-based interact with VALKYRIES applications.

**Schedule of relevant Milestones**

<b>Milestone number<sup>18</sup></b>	<b>Milestone title</b>	<b>Lead beneficiary</b>	<b>Due Date (in months)</b>	<b>Means of verification</b>
MS1	Kick-off celebrated, set up comm. tools and project website	1 - INDRA	1	Plenary meeting, website launch and Y1 plans agreed
MS2	Consultation Strategy and protocol for managing risks due to Covid-19	1 - INDRA	1	D1.7 and D1.8 agreed and delivered
MS4	Basic design principles: legal and ethical profiles, terminology and semantics, DMP, interoperability certification and harmonization strategy	16 - NOVOTEC	6	First VALKYRIES workshop on ethical legal, standardization. D1.3, D2.5, D2.6, D3.2, D2.2, D3.4 delivered.
MS5	VALKYRIES Dashboard	1 - INDRA	8	D1.11 delivered
MS9	Concepts of Operation and final scope of the reference integration and demonstration scenarios. Intermediate retrospective of ethical, regulatory and standardization actions	16 - NOVOTEC	12	Second VALKYRIES workshop on ethical, legal and standardization. D2.1, D2.3, D1.4, D1.6, D1.9, D1.6 updated and delivered.
MS17	Rationale, Data Management Platform, datasets and final impact, exploitation and dissemination actions	1 - INDRA	24	Fourth VALKYRIES workshop on ethical, legal and standardization. D1.5,

**Schedule of relevant Milestones**

<b>Milestone number<sup>18</sup></b>	<b>Milestone title</b>	<b>Lead beneficiary</b>	<b>Due Date (in months)</b>	<b>Means of verification</b>
				D3.6, D7.1, D7.5, D1.10 delivered.

<b>Work package number</b> <sup>9</sup>	WP2	<b>Lead beneficiary</b> <sup>10</sup>	16 - NOVOTEC
<b>Work package title</b>	Design Principles and harmonisation Tactics		
<b>Start month</b>	1	<b>End month</b>	24

### Objectives

The WP2 will provide the design, specifications and requirements to take into account by the rest of the project life cycle. This includes an in-depth review of system requirements, consultations to stakeholders and pre-standardisation research, to design audition, hardening and self-protection capabilities, and define the demonstration use cases. WP2 also defines the APIs and interfaces needed for their internal/external communications, the overarching architecture, the harmonisation framework and the traceability of dependencies between components towards achieving a reference integration of the targeted technologies, equipment and operational procedures. The task will also manage the enforcement of the harmonization and standardizations strategies, guiding the VALKYRIES engagement in pre-standardization and standardization actions.

### Description of work and role of partners

#### **WP2 - Design Principles and harmonisation Tactics** [Months: 1-24]

**NOVOTEC**, **INDRA**, **SERMAS**, **TASSICA SA**, **ISEMI**, **UMU**, **SSS**, **BC2050**, **BDI**, **BRC**, **KEMEA**, **HESE**, **ARATOS.NET**, **USN**, **AREU**, **HRT**, **PARTICLE**

The project design principles, standardization and harmonization outcomes will feed the technological, procedural and collaborative working streams. In this WP the following tasks will be carried out:

**Task T2.1: System Requirements, Concepts of Operation and demonstrators.** This task builds on the definition of the technical requirements for VALKYRIES, including requirements associated with each work package. Through task T2.1, potential use cases, Vignettes, and Concepts of Operations (CONOPs) of the potential applicability of the targeted solutions will be developed. Based on such operational vignettes and CONOPs, this task will define the VALKYRIES demonstration scenarios and use cases.

**Task T2.2: Terminology and Semantic Interoperability.** this task will review the preliminary efforts with the ultimate objective of providing joint terminologies and semantic representations, concluding with a unified glossary and map that at least shall extend those standardized at ISO 22300.

**Task T2.3: Overarching Architecture, APIS and Interfaces.** The main objective is to guide the reference implementation of the targeted procedures and technologies by developing their Overarching Architecture (OA) in a modular approach. The architecture will be based on the Platform Independent Model (PIM) paradigm, so that stakeholders and project partners will equally understand it.

**Task T2.4: European pre-standardisation map and joint roadmap.** This task will examine the current state of standardisation map and joint roadmap, and it will determine the improvements to apply them in this project.

**Task T2.5: Dynamic Harmonisation and Standardisation.** This task will cover the definition and enforcement of the VALKYRIES harmonisation framework. The definition of common certification schemes will be embedded in the existing legal framework and will explore the feasibility of proposing/recommending legal amendments or new requirements.

### Participation per Partner

<b>Partner number and short name</b>	<b>WP2 effort</b>
1 - INDRA	2.00
IFT	2.00
2 - SERMAS	2.00
FIIBAP	5.00
3 - TASSICA SA	6.00
4 - ISEMI	1.50
5 - UMU	6.00

Partner number and short name	WP2 effort
6 - SSS	5.00
7 - BC2050	8.00
8 - BDI	2.00
9 - BRC	2.00
10 - KEMEA	6.00
11 - HESE	5.00
12 - ARATOS.NET	7.00
13 - USN	5.00
14 - AREU	4.00
15 - HRT	5.00
16 - NOVOTEC	21.00
17 - PARTICLE	14.00
<b>Total</b>	<b>108.50</b>

#### List of deliverables

Deliverable Number <sup>14</sup>	Deliverable Title	Lead beneficiary	Type <sup>15</sup>	Dissemination level <sup>16</sup>	Due Date (in months) <sup>17</sup>
D2.1	Definition of System Requirements and Demonstration Use Cases	1 - INDRA	Report	Public	5
D2.2	Terminology and Semantics	3 - TASSICA SA	Report	Public	6
D2.3	Architecture Design Document	17 - PARTICLE	Report	Public	7
D2.4	Map of Standards and joint roadmap	16 - NOVOTEC	Report	Public	5
D2.5	Harmonization framework	16 - NOVOTEC	Report	Public	12
D2.6	Harmonization and Standardization Reports	16 - NOVOTEC	Report	Public	6

#### Description of deliverables

The list of deliverables related to this WP is as follows:

- D2.1: Definition of System Requirements and Demonstration Use Cases
- D2.2: Terminology and Semantics
- D2.3: Architecture Design Document
- D2.4: Map of Standards and joint roadmap
- D2.5: Harmonization framework
- D2.6: Harmonization and Standardization Reports

D2.1 : Definition of System Requirements and Demonstration Use Cases [5]

It will detail the use cases to implement for demonstration, as well as the requirements of VALKYRIES. It will be submitted at M5 and M12.

#### D2.2 : Terminology and Semantics [6]

Joint terminologies and semantic representations, concluding with a unified glossary and map that at least shall extend those standardized at ISO 22300.

#### D2.3 : Architecture Design Document [7]

This report presents VALKYRIES architecture (high-level design) for the reference integration, describing main components, inter-relations and interfaces with external systems. APIs will be specified. The document is completed in two iterations (M7/M12).

#### D2.4 : Map of Standards and joint roadmap [5]

It presents the analysis and map of the planned and ongoing VALKYRIES related standardization actions, depicting a joint roadmap of them.

#### D2.5 : Harmonization framework [12]

It presents the VALKYRIES methodology for agile harmonization and standardization, including a set of standards (requirements and recommendations), procedures and guidelines for operation, technology and equipment and certification scheme/s. It will be dynamically updated based on its effectiveness, conducted corrections, and related opportunities discovered. It will be submitted at M12 and M24.

#### D2.6 : Harmonization and Standardization Reports [6]

Harmonization and Standardization Reports submitted every 6 months (M6/M12/M18/M24).

### Schedule of relevant Milestones

Milestone number <sup>18</sup>	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS3	Requirements and standardization map	16 - NOVOTEC	5	D2.1 and D2.4 delivered
MS4	Basic design principles: legal and ethical profiles, terminology and semantics, DMP, interoperability certification and harmonization strategy	16 - NOVOTEC	6	First VALKYRIES workshop on ethical legal, standardization. D1.3, D2.5, D2.6, D3.2, D2.2, D3.4 delivered.
MS9	Concepts of Operation and final scope of the reference integration and demonstration scenarios. Intermediate retrospective of ethical, regulatory and standardization actions	16 - NOVOTEC	12	Second VALKYRIES workshop on ethical, legal and standardization. D2.1, D2.3, D1.4, D1.6, D1.9, D1.6 updated and delivered.
MS17	Rationale, Data Management Platform, datasets and final impact, exploitation and dissemination actions	1 - INDRA	24	Fourth VALKYRIES workshop on ethical, legal and standardization. D1.5, D3.6, D7.1, D7.5, D1.10 delivered.



<b>Work package number</b> <sup>9</sup>	WP3	<b>Lead beneficiary</b> <sup>10</sup>	6 - SSS
<b>Work package title</b>	Responsible innovation, certification and exploitation		
<b>Start month</b>	1	<b>End month</b>	24

### Objectives

The WP3 aims to identify the impact of the VALKYRIES ecosystem on the relevant ethical-legal and societal aspects, providing regulatory insights and standardisation solutions. WP3 unfolds in specific tasks oriented to both 1) identify, compare and criticize the hard law and soft law regulatory framework relevant for paving the way to innovative standardisation and certification in crisis management, 2) to cover the standardisation needs emerging in the VALKYRIES context. The WP will employ responsible innovation approaches to integrate knowledge related to stakeholders operating at both the demand and the supply side of the disaster response community, including technologists, citizens, policymakers and ethicists.

### Description of work and role of partners

#### **WP3 - Responsible innovation, certification and exploitation** [Months: 1-24]

SSS, INDRA, SERMAS, TASSICA SA, ISEMI, UMU, BDI, BRC, KEMEA, HESE, USN, HRT, NOVOTEC, PARTICLE

The project certification and exploitation actions will feed the technological, procedural and collaborative working streams. In this WP the following tasks will be carried out:

Task T3.1: Identification of relevant ethical, legal and societal aspects between hard law and soft law. The analysis will cover the current legislative background and security standards landscape in Europe, covering the most relevant EU and national standards, as well as ISO and IEC.

Task T3.2: Investigation of key challenges and promising solution approaches to improve interoperability. In parallel with on the regulatory analysis conducted in T3.1.1, this task identifies the standardisation needs emerging from the interoperability gaps in operational environments during disaster situations.

Task T3.3: Data protection and IP boundaries to improve interoperability and deployment. Taking also into consideration the technical hints from T3.1-2 and inputs emerging, especially from WPs 4-5, this task will evaluate the limits and opportunities to achieve in the technical interoperability provided by the European data protection and intellectual property framework.

Task T3.4: mapping and harmonization needs to improve standards, including voluntary Standard Operating Procedures (SOPs) and/or ISO or EN standards.

Task T3.5: Sustainable International/European Certification and evaluation facilities. This task will analyse different national European certification initiatives as well as international efforts to identify commonalities and differences.

Task T3.6: Sustainable exploitation and commercial deployment. This task aims to define a sustainable exploitation strategy for all VALKYRIES project results in relation to licencing preferences and obligations of partners participating in the creation of the result. Prior licencing schemes applied to pre-existing IPRs will be formalized and adapted to the framework to ensure sustainability.

### Participation per Partner

<b>Partner number and short name</b>	<b>WP3 effort</b>
1 - INDRA	22.00
IFT	2.00
2 - SERMAS	1.00
FIIBAP	2.00
3 - TASSICA SA	9.00
4 - ISEMI	5.00
5 - UMU	6.00

Partner number and short name	WP3 effort
6 - SSS	28.00
8 - BDI	11.00
9 - BRC	5.00
10 - KEMEA	5.00
11 - HESE	8.00
13 - USN	12.00
15 - HRT	2.00
16 - NOVOTEC	24.00
17 - PARTICLE	4.00
<b>Total</b>	<b>146.00</b>

#### List of deliverables

Deliverable Number <sup>14</sup>	Deliverable Title	Lead beneficiary	Type <sup>15</sup>	Dissemination level <sup>16</sup>	Due Date (in months) <sup>17</sup>
D3.1	Report on relevant ethical-legal and societal aspects	6 - SSS	Report	Public	12
D3.2	Report on the technical, legal, and ethical profiles related to the interoperability of first response capabilities	1 - INDRA	Report	Public	6
D3.3	Report on data protection and IP boundaries in the applicable framework	6 - SSS	Report	Public	22
D3.4	Sustainable certification, conformity criteria and evaluation	13 - USN	Report	Public	6
D3.5	Business Cases	1 - INDRA	Report	Public	20
D3.6	Exploitation Plan	1 - INDRA	Report	Public	24

#### Description of deliverables

The list of deliverables related to this WP is as follows:

- D3.1: Report on relevant ethical-legal and societal aspects
- D3.2: Report on the technical, legal, and ethical profiles related to the interoperability of first response capabilities
- D3.3: Report on data protection and IP boundaries in the applicable framework
- D3.4 Sustainable certification, conformity criteria and evaluation
- D3.5: Business Cases
- D3.6: Exploitation Plan

D3.1 : Report on relevant ethical-legal and societal aspects [12]

Identification and assessment of the VALKYRIES related ethical, legal and societal aspects between hard law and soft law. Includes map and harmonization needs to improve standards, including voluntary Standard Operating Procedures (SOPs) and/or ISO or EN standards.

D3.2 : Report on the technical, legal, and ethical profiles related to the interoperability of first response capabilities [6]

Analysis of key challenges and promising approaches to improve interoperability. It will be submitted at M6, M12 and M24.

D3.3 : Report on data protection and IP boundaries in the applicable framework [22]

Analysis of the Data protection and IP boundaries to improve related interoperability and deployment.

D3.4 : Sustainable certification, conformity criteria and evaluation [6]

Analysis and map of the certification-related gaps and opportunities (including testing procedures and facilities). Details the potential procedures for their exploitation. It will be submitted at M6, M12 and M24.

D3.5 : Business Cases [20]

Report of the different business cases raised for the conducted research, integrations, applications and demonstrations.

D3.6 : Exploitation Plan [24]

It will report a detailed plan describing the exploitation activities of the VALKYRIES Consortium and the individual expectations of its partners.

#### Schedule of relevant Milestones

Milestone number <sup>18</sup>	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS4	Basic design principles: legal and ethical profiles, terminology and semantics, DMP, interoperability certification and harmonization strategy	16 - NOVOTEC	6	First VALKYRIES workshop on ethical legal, standardization. D1.3, D2.5, D2.6, D3.2, D2.2, D3.4 delivered.
MS11	Canvas analysis of outcomes and business cases	6 - SSS	20	D3.5 delivered
MS17	Rationale, Data Management Platform, datasets and final impact, exploitation and dissemination actions	1 - INDRA	24	Fourth VALKYRIES workshop on ethical, legal and standardization. D1.5, D3.6, D7.1, D7.5, D1.10 delivered.

<b>Work package number</b> <sup>9</sup>	WP4	<b>Lead beneficiary</b> <sup>10</sup>	5 - UMU
<b>Work package title</b>	Equipment and ICT enablers for First Aid Responses		
<b>Start month</b>	4	<b>End month</b>	18

### Objectives

The main aim of WP4 is to deliver a harmonisation and standardisation framework capable of supporting given technological solutions, developed and real use case driven implemented for first responders by considering a cross-border, cross-sectorial and cross-hierarchical approach, with the following capabilities thanks to the actual digitalisation/virtualisation technologies (incl. AI-based enablers) applicable to first aid actuations: 1) the utilisation of all available equipment at disaster situations for successful actuation, with particular emphasis the health support wearable devices to monitor and analyse both patients and emergency response staff; 2) enable the establishment of trusted communications for sharing operational information in a multi-domain environment of stakeholders; 3) the setting up of a mobile C&C to put in place both operational decision-making and action planning in a coordinated way; and 4) to allow the deployment of connected and autonomous driving enablers to support the disaster response actuation.

### Description of work and role of partners

#### **WP4 - Equipment and ICT enablers for First Aid Responses** [Months: 4-18]

UMU, INDRA, SERMAS, TASSICA SA, ISEMI, SSS, BC2050, BRC, KEMEA, HESE, ARATOS.NET, USN, AREU, NOVOTEC, PARTICLE

Corresponds to the technological workstream. In this WP the following tasks will be carried out:

Task T4.1: First aid vehicles and supportive autonomous units. The task T4.1 will analyse the technological opportunities for first aid response on self-driving and unmanned vehicles, then revising their related regulatory and normalization gaps.

Task T4.2: Trusted Communication infrastructure and end-user terminals. The main gaps, challenges and regulatory barriers for their adoption will be reviewed, resulting in a set of harmonization opportunities and a roadmap for integration into the EU Security Market.

Task T4.3: Mobile Command and Control and Operational Coordination technologies. Analysis of the state of the art and gaps of the mobile Command, Control & Communication Information Systems (C3ISR) on which the first responders in emergency situations rely, to identify the opportunities for technological improvement of these systems.

Task T4.4: The digitalisation on first aid actuations. Task T4.4 will study the role of the emerging digitalization paradigm, which is leading to advanced modelling, virtualization and simulation capabilities to be applied by First Response teams.

Task T4.5: Instrumentation and health support wearable devices. Study and identification of technologies that can have a positive impact on this type of device and which contribute to mapping the operational environment and improve the efficiency of response logistics while supporting the operation of the equipment.

### Participation per Partner

<b>Partner number and short name</b>	<b>WP4 effort</b>
1 - INDRA	2.00
IFT	16.00
2 - SERMAS	6.00
FIIBAP	4.00
3 - TASSICA SA	10.00
4 - ISEMI	3.00
5 - UMU	26.00
6 - SSS	8.00
7 - BC2050	25.00

Partner number and short name	WP4 effort
9 - BRC	2.00
10 - KEMEA	2.00
11 - HESE	6.00
12 - ARATOS.NET	10.00
13 - USN	11.00
14 - AREU	16.00
16 - NOVOTEC	4.00
17 - PARTICLE	15.00
<b>Total</b>	<b>166.00</b>

#### List of deliverables

Deliverable Number <sup>14</sup>	Deliverable Title	Lead beneficiary	Type <sup>15</sup>	Dissemination level <sup>16</sup>	Due Date (in months) <sup>17</sup>
D4.1	Landscape of emerging technological opportunities for first aid response on multi-casualty disasters	5 - UMU	Report	Public	9
D4.2	Harmonization opportunities on the technological landscape for first aid response on multi-casualty disasters	5 - UMU	Report	Public	11
D4.3	Roadmap for enhancing the pan-European technological capabilities for first aid response on multi-casualty disasters	5 - UMU	Report	Public	18
D4.4	VALKYRIES harmonisations on first aid response technologies and equipment	5 - UMU	Demonstrator	Public	18

#### Description of deliverables

The list of deliverables related to this WP is as follows:

- D4.1: Landscape of emerging technological opportunities for first aid response on multi-casualty disasters
- D4.2: Harmonization opportunities on the technological landscape for first aid response on multi-casualty disasters
- D4.3: Roadmap for enhancing the pan-European technological capabilities for first aid response on multi-casualty disasters
- D4.4: VALKYRIES harmonisations on first aid response technologies and equipment

D4.1 : Landscape of emerging technological opportunities for first aid response on multi-casualty disasters [9]

Description of the technical opportunities identified and assessed during the working streams conducted at T4.1, T4.2, T4.3, T4.4 and T4.5. It will be submitted at M9 and M18.

D4.2 : Harmonization opportunities on the technological landscape for first aid response on multi-casualty disasters [11]

Identification and assessment of the regulatory, certification and standardization needs and gaps on the existing and emerging technologies for supporting first aid responses, emphasizing those covered by the working streams driven by T4.1, T4.2, T4.3, T4.4 and T4.5. It will be submitted at M11 and M18.

D4.3 : Roadmap for enhancing the pan-European technological capabilities for first aid response on multi-casualty disasters [18]

Analysis, prioritization and scheduling of the evolution and adoption of the technological capabilities for first aid responses on the EU Security Market.

D4.4 : VALKYRIES harmonisations on first aid response technologies and equipment [18]

This deliverable presents the selected enablers for addressing the requirements of the reference integration. Besides, the deliverable reports the application of the VALKYRIES harmonization tactics on them. At M18, both Report (R) and Demonstrator (DEM) will be delivered.

#### Schedule of relevant Milestones

Milestone number <sup>18</sup>	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS6	Preliminary landscape of emerging technological, procedural, training and collaboration opportunities	3 - TASSICA SA	9	First version of D4.1, D5.1 and D6.1 delivered
MS8	Preliminary analysis of certification, regulation, standardization and harmonization opportunities of technologies, procedures, training and collaboration	6 - SSS	11	First version of D4.2, D5.2 and D6.2 delivered
MS10	Closure of the technological, procedural, training and collaboration working streams (WP4-5-6). Local Harmonization on the selected enablers, and definition of related EU-level roadmaps	16 - NOVOTEC	18	Third VALKYRIES workshop on ethical, legal and standardization. D4.3, D4.4, D5.3, D6.3, D6.4 delivered. D7.3 delivered (System validation and evaluation).
MS17	Rationale, Data Management Platform, datasets and final impact, exploitation and dissemination actions	1 - INDRA	24	Fourth VALKYRIES workshop on ethical, legal and standardization. D1.5, D3.6, D7.1, D7.5, D1.10 delivered.

<b>Work package number</b> <sup>9</sup>	WP5	<b>Lead beneficiary</b> <sup>10</sup>	3 - TASSICA SA
<b>Work package title</b>	Common Practices, and operational procedures for First Aid Responses		
<b>Start month</b>	4	<b>End month</b>	18

### Objectives

The main aim of WP5 is to provide a global information framework of the common EU operational plans and procedures, and deliver guidelines and harmonisation recommendations for practices and operational procedures for facilitating, guiding and enhancing the cooperation between actors in the first aid response to mass casualty incidents and disasters. The WP5 will facilitate the understanding of the complex map of practises and operative procedures in aid response to mass casualty incidents and disasters, by surveying, studying and analysing the common practices, reconnaissance, triage and care of victims, crisis response planning, maintenance, logistics, C&C operations, development of a Common Operational Picture and alerting/warning. In the course of WP5, partners will work at assembling draft standards or suggesting modifications of the existing ones for solving the gaps and harmonisation issues found, and lessons learned.

### Description of work and role of partners

#### **WP5 - Common Practices, and operational procedures for First Aid Responses** [Months: 4-18]

**TASSICA SA, INDRA, SERMAS, ISEMI, UMU, SSS, BDI, BRC, KEMEA, HESE, ARATOS.NET, USN, AREU, HRT, NOVOTEC, PARTICLE**

Corresponds to the procedural workstream. In this WP the following tasks will be carried out:

Task T5.1: Reconnaissance, triage and crisis response planning. The objective of this task is to provide global information framework of the common EU operational plans and procedures, and deliver guidelines and harmonisation recommendations for reconnaissance procedures, triage and care practises, and crisis response planning.

Task T5.2: Maintenance, logistics and Deployment. The goal of this task is to plan, organise, implement and develop maintenance, logistics and deployment for first aid responses.

Task T5.3: Command and Control and support to operational decision-making. To explore existing gaps and emerging enablers towards defining an information network that allows emergency commanders to maintain situational awareness and obtain relevant information for decision making.

Task T5.4: Common Operational Picture and warning. This task aims to define a VALKYRIES Common Operational Picture with all the relevant information that facilitate collaborative planning and the coordinated execution of the response by all the levels involved.

### Participation per Partner

<b>Partner number and short name</b>	<b>WP5 effort</b>
1 - INDRA	4.00
IFT	2.00
2 - SERMAS	6.00
FIIBAP	2.00
3 - TASSICA SA	22.00
4 - ISEMI	5.00
5 - UMU	8.00
6 - SSS	4.00
8 - BDI	8.00
9 - BRC	9.00
10 - KEMEA	4.00
11 - HESE	1.00

Partner number and short name	WP5 effort
12 - ARATOS.NET	21.00
13 - USN	1.00
14 - AREU	15.00
15 - HRT	6.00
16 - NOVOTEC	2.00
17 - PARTICLE	6.00
<b>Total</b>	<b>126.00</b>

#### List of deliverables

Deliverable Number <sup>14</sup>	Deliverable Title	Lead beneficiary	Type <sup>15</sup>	Dissemination level <sup>16</sup>	Due Date (in months) <sup>17</sup>
D5.1	Landscape of emerging operational and procedural opportunities for first aid response on multi-casualty disasters	3 - TASSICA SA	Report	Public	9
D5.2	Harmonization opportunities on the operational and procedural landscape for first aid response on multi-casualty disasters	3 - TASSICA SA	Report	Public	11
D5.3	Roadmap for enhancing the pan-European operational and procedural capabilities for first aid response on multi-casualty disasters	3 - TASSICA SA	Report	Public	18
D5.4	VALKYRIES harmonisations on first aid response common practices and procedures	3 - TASSICA SA	Demonstrator	Public	18

#### Description of deliverables

The list of deliverables related to this WP is as follows:

- D5.1: Landscape of emerging operational and procedural opportunities for first aid response on multi-casualty disasters
- D5.2: Harmonization opportunities on the operational and procedural landscape for first aid response on multi-casualty disasters
- D5.3: Roadmap for enhancing the pan-European operational and procedural capabilities for first aid response on multi-casualty disasters
- D5.4: VALKYRIES harmonisations on first aid response common practices and procedures

D5.1 : Landscape of emerging operational and procedural opportunities for first aid response on multi-casualty disasters [9]



Description of the procedural and operational opportunities identified and assessed during the working streams conducted at T5.1, T5.2, T5.3 and T5.4. It will be submitted at M9 and M18.

D5.2 : Harmonization opportunities on the operational and procedural landscape for first aid response on multi-casualty disasters [11]

Identification and assessment of the regulatory, certification and standardization needs and gaps on the existing and emerging procedures for supporting first aid responses, emphasizing those covered by the working streams driven by T5.1, T5.2, T5.3, T5.4 and T5.5. It will be submitted at M11 and M18.

D5.3 : Roadmap for enhancing the pan-European operational and procedural capabilities for first aid response on multi-casualty disasters [18]

Analysis, prioritization and scheduling of the evolution and adoption of new common practices and procedures for first aid responses on the EU Security Market.

D5.4 : VALKYRIES harmonisations on first aid response common practices and procedures [18]

It presents the selected enablers for addressing the requirements of the reference integration and will report the application of the VALKYRIES harmonization tactics on them. At M18, both Report (R) and Demonstrator (DEM) will be delivered.

#### Schedule of relevant Milestones

Milestone number <sup>18</sup>	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS6	Preliminary landscape of emerging technological, procedural, training and collaboration opportunities	3 - TASSICA SA	9	First version of D4.1, D5.1 and D6.1 delivered
MS8	Preliminary analysis of certification, regulation, standardization and harmonization opportunities of technologies, procedures, training and collaboration	6 - SSS	11	First version of D4.2, D5.2 and D6.2 delivered
MS10	Closure of the technological, procedural, training and collaboration working streams (WP4-5-6). Local Harmonization on the selected enablers, and definition of related EU-level roadmaps	16 - NOVOTEC	18	Third VALKYRIES workshop on ethical, legal and standardization. D4.3, D4.4, D5.3, D6.3, D6.4 delivered. D7.3 delivered (System validation and evaluation).
MS17	Rationale, Data Management Platform, datasets and final impact, exploitation and dissemination actions	1 - INDRA	24	Fourth VALKYRIES workshop on ethical, legal and standardization. D1.5, D3.6, D7.1, D7.5, D1.10 delivered.

<b>Work package number</b> <sup>9</sup>	WP6	<b>Lead beneficiary</b> <sup>10</sup>	8 - BDI
<b>Work package title</b>	Cooperation, Education and Training for First Aid Responses		
<b>Start month</b>	4	<b>End month</b>	18

### Objectives

The objective of WP6 is to plan, organise and implement international comparative research and analyses on the process of building a harmonisation framework for facilitating, guiding and enhancing the cooperation between vehicular first aid responders with other disaster management actors (firefighters, law enforcement agencies, civilian protection authorities, military, heterogeneous voluntary organisations, etc.). The following working streams will be conducted during its execution: Resource Federation and trusted information sharing, Education and Training for first aid responses, Raising practitioner and social awareness, Civil-Military Cooperation, Civil Protection cooperation and Aid Volunteerism.

### Description of work and role of partners

#### **WP6 - Cooperation, Education and Training for First Aid Responses** [Months: 4-18]

**BDI, INDRA, SERMAS, TASSICA SA, ISEMI, UMU, SSS, BC2050, BRC, KEMEA, HESE, USN, AREU, HRT, NOVOTEC, PARTICLE**

Corresponds to the collaborative workstream. In this WP the following tasks will be carried out:

Task T6.1: Resource Federation and trusted information sharing. This task will explore emerging collaboration opportunities focalised on resource federation and trusted information sharing, revealing their map, regulatory/normalization gaps and proposing a roadmap for their mitigation.

Task T6.2: Education and Training for first aid responses. The goal of this task is to plan, organise and implement thorough study and analysis of the existing capabilities, debriefing principles for first aid relate to pan-European exercises and cross-border crises supported by recent technological and procedural tools in support of preparation of a framework for joint education and training for the European Emergency Medical Services.

Task T6.3: Raising practitioner and social awareness. This task will review the collaborative opportunities for raising the public and practitioner awareness at disaster management situations, which will result in a map of the identified opportunities.

Task T6.4: Civil-Military Cooperation. The goal of this task is to explore the role of CIMIC, particularly in the case of large-scale cross-border disasters with mass casualties as a key factor for successful crisis management.

Task T6.5: Civil Protection and Aid Volunteerism. This task will explore the current and ongoing opportunities for cross-sectorial cooperation, emphasizing the collaboration between first aid response teams with other Civilian Protection and volunteering platforms.

### Participation per Partner

<b>Partner number and short name</b>	<b>WP6 effort</b>
1 - INDRA	10.00
2 - SERMAS	3.00
FIIBAP	4.00
3 - TASSICA SA	9.00
4 - ISEMI	5.50
5 - UMU	6.00
6 - SSS	6.00
7 - BC2050	6.00
8 - BDI	12.00
9 - BRC	22.00

Partner number and short name	WP6 effort
10 - KEMEA	4.00
11 - HESE	6.00
13 - USN	1.00
14 - AREU	8.00
15 - HRT	5.00
16 - NOVOTEC	2.00
17 - PARTICLE	2.00
<b>Total</b>	<b>111.50</b>

#### List of deliverables

Deliverable Number <sup>14</sup>	Deliverable Title	Lead beneficiary	Type <sup>15</sup>	Dissemination level <sup>16</sup>	Due Date (in months) <sup>17</sup>
D6.1	Landscape of emerging preparedness and cross-sectorial collaboration opportunities for first aid response on multi-casualty disasters	8 - BDI	Report	Public	9
D6.2	Harmonization opportunities on the preparedness and cross-sectorial collaboration for first aid response on multi-casualty disasters	8 - BDI	Report	Public	11
D6.3	Roadmap for enhancing the pan-European preparedness and cross-sectorial collaboration for first aid response on multi-casualty disasters	8 - BDI	Report	Public	18
D6.4	VALKYRIES harmonisations on first aid preparedness and cross-sectorial collaboration	8 - BDI	Demonstrator	Public	18

#### Description of deliverables

The list of deliverables related to this WP is as follows:

- D6.1: Landscape of emerging preparedness and cross-sectorial collaboration opportunities for first aid response on multi-casualty disasters
- D6.2: Harmonization opportunities on the preparedness and cross-sectorial collaboration for first aid response on multi-casualty disasters
- D6.3: Roadmap for enhancing the pan-European preparedness and cross-sectorial collaboration for first aid response on multi-casualty disasters
- D6.4: VALKYRIES harmonisations on first aid preparedness and cross-sectorial collaboration

D6.1 : Landscape of emerging preparedness and cross-sectorial collaboration opportunities for first aid response on multi-casualty disasters [9]

Description of collaborative, education and training opportunities identified/assessed during the working streams conducted at T6.1, T6.2, T6.3, T6.4, and T6.5. It will be submitted at M9 and M18.

D6.2 : Harmonization opportunities on the preparedness and cross-sectorial collaboration for first aid response on multi-casualty disasters [11]

Report on the main interoperability gaps among different actors engaged in crisis management and recommendations for improvements in doctrinal/procedural, operational and tactical documents and instruments for civil-military collaboration. It will be submitted at M11 and M18.

D6.3 : Roadmap for enhancing the pan-European preparedness and cross-sectorial collaboration for first aid response on multi-casualty disasters [18]

Analysis, prioritization and scheduling of the evolution/adoption of new collaboration and training capabilities for first aid responses on the EU Security Market.

D6.4 : VALKYRIES harmonisations on first aid preparedness and cross-sectorial collaboration [18]

Presents the selected enablers for addressing the requirements of the reference integration. Besides, the deliverable reports the application of the VALKYRIES harmonization tactics on them. At M18, both Report (R) and Demonstrator (DEM) will be delivered.

#### Schedule of relevant Milestones

Milestone number <sup>18</sup>	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS6	Preliminary landscape of emerging technological, procedural, training and collaboration opportunities	3 - TASSICA SA	9	First version of D4.1, D5.1 and D6.1 delivered
MS8	Preliminary analysis of certification, regulation, standardization and harmonization opportunities of technologies, procedures, training and collaboration	6 - SSS	11	First version of D4.2, D5.2 and D6.2 delivered
MS10	Closure of the technological, procedural, training and collaboration working streams (WP4-5-6). Local Harmonization on the selected enablers, and definition of related EU-level roadmaps	16 - NOVOTEC	18	Third VALKYRIES workshop on ethical, legal and standardization. D4.3, D4.4, D5.3, D6.3, D6.4 delivered. D7.3 delivered (System validation and evaluation).
MS17	Rationale, Data Management Platform, datasets and final impact, exploitation and dissemination actions	1 - INDRA	24	Fourth VALKYRIES workshop on ethical, legal and standardization. D1.5, D3.6, D7.1, D7.5, D1.10 delivered.

<b>Work package number</b> <sup>9</sup>	WP7	<b>Lead beneficiary</b> <sup>10</sup>	4 - ISEMI
<b>Work package title</b>	Reference Integration, Evaluation and Demonstration		
<b>Start month</b>	5	<b>End month</b>	24

### Objectives

The main aim of the WP7 is to ensemble a validated reference integrated platform (SIGRUN) that proves the effectiveness of the harmonization of the use case driven capabilities conducted thorough the VALKYRIES project. The reference integration shall be accomplished under a horizontal integration approach managed by Enterprise Service Buses (ESB), which shall implement the Overarching Architecture (OA) defined in task T2.3 to integrate the different components developed throughout the project on the grounds of the service-oriented architecture (SOA) paradigm. On the other hand, the WP7 includes an initial definition of the evaluation methodology that will serve as a guide for the rest of the demonstration activities. Afterward, the complete validation and evaluation of SIGRUN will be carried out, at first place in virtual labs and testbeds on isolated and controlled environments and, after validation, with the execution of the use cases in the for selected demonstrators in Spain-Portugal, Slovakia-Austria, Bulgaria-Greece and Norway-Netherlands-Denmark. As ISEMI is the leading FR partner in the Consortium involving cross-sector activities (in particular, firefighters, police and health system), it has been selected as the best possible leader for this core demonstration WP in the project.

### Description of work and role of partners

#### **WP7 - Reference Integration, Evaluation and Demonstration** [Months: 5-24]

**ISEMI**, INDRA, SERMAS, TASSICA SA, UMU, SSS, BC2050, BDI, BRC, KEMEA, HESE, ARATOS.NET, USN, AREU, HRT, NOVOTEC, PARTICLE

The outcomes of technological, procedural and collaborative streams will converge in the VALKYRIES reference integrated platform (SIGRUN), evaluation and demonstration actions. In this WP the following tasks will be carried out: Task T7.1: Testbeds and evaluation methodology. This task aims to design and develop virtual labs and testbeds for combination and testing of components and procedures that will be defined in the previous WPs.

Task T7.2: Datasets Management and Benchmarking. The main objective of this task is to design, collect, analyse and label a complete dataset to support VALKYRIES' related Machine Learning (ML) capabilities, being considered from training and model building procedures to the validation of different project functional blocks.

Task T7.3: Reference Integration and harmonisations. This task includes all the activities and efforts related to the reference integration and harmonization.

Task T7.4: Evaluation and validation. This task will enclose all the activities related to testing the components, modules, interfaces, procedures, etc., reference integrated as well as their interoperability, normalization and harmonization to support first aid responses on disaster scenarios.

Task T7.5: Demonstrator #1: Spain-Portugal. The task T7.5 shall cover the planning, implementation, integration, executing, analysis and reporting activities concerning the demonstration scenario: UC#1: Join cross-frontier first aid response against major fire disaster (Spain-Portugal).

Task T7.6: Demonstrator #2: Slovakia-Austria. The task T7.6 shall cover the planning, implementation, integration, executing, analysis and reporting activities concerning the demonstration scenario: UC#2: Reassessment toxic threats for cross-border regions in Europe (Slovakia-Austria).

Task T7.7: Demonstrator #3: Bulgaria-Greece. The task T7.7 shall cover the planning, implementation, integration, executing, analysis and reporting activities concerning the demonstration scenario: UC#3: Cross-border crisis due to an earthquake (Bulgaria-Greece).

Task T7.8: Demonstrator #8: Norway-Netherlands-Denmark. The task T7.8 shall cover the planning, implementation, integration, executing, analysis and reporting activities concerning the demonstration scenario: UC#4: Rescue of people and collection of pollution on sea in international waters (Norway-Netherlands-Denmark).

### Participation per Partner

<b>Partner number and short name</b>	<b>WP7 effort</b>
1 - INDRA	5.00

Partner number and short name	WP7 effort
IFT	8.00
2 - SERMAS	14.00
FIIBAP	7.00
3 - TASSICA SA	9.00
4 - ISEMI	12.00
5 - UMU	14.00
6 - SSS	8.00
7 - BC2050	24.00
8 - BDI	14.00
9 - BRC	18.00
10 - KEMEA	24.00
11 - HESE	19.00
12 - ARATOS.NET	31.00
13 - USN	12.00
14 - AREU	8.00
15 - HRT	10.00
16 - NOVOTEC	4.00
17 - PARTICLE	19.00
<b>Total</b>	<b>260.00</b>

#### List of deliverables

Deliverable Number <sup>14</sup>	Deliverable Title	Lead beneficiary	Type <sup>15</sup>	Dissemination level <sup>16</sup>	Due Date (in months) <sup>17</sup>
D7.1	Datasets Management and Benchmarking	10 - KEMEA	Demonstrator	Public	24
D7.2	Testbeds and Evaluation Methodology	5 - UMU	Demonstrator	Public	10
D7.3	System Validation and Evaluation	1 - INDRA	Report	Public	18
D7.4	VALKYRIES Reference Integration and lessons learned	10 - KEMEA	Report	Public	21
D7.5	Report of the use case: Spain-Portugal	2 - SERMAS	Demonstrator	Public	24
D7.6	Report of the use case: Slovakia-Austria	4 - ISEMI	Demonstrator	Public	24
D7.7	Report of the use case: Bulgaria-Greece	8 - BDI	Demonstrator	Public	24

### List of deliverables

Deliverable Number <sup>14</sup>	Deliverable Title	Lead beneficiary	Type <sup>15</sup>	Dissemination level <sup>16</sup>	Due Date (in months) <sup>17</sup>
D7.8	Report of the use case: Norway-Netherlands	13 - USN	Demonstrator	Public	24

### Description of deliverables

The list of deliverables related to this WP is as follows:

- D7.1: Datasets Management and Benchmarking
- D7.2: Testbeds and Evaluation Methodology
- D7.3: System Validation and Evaluation
- D7.4: VALKYRIES Reference Integration and lessons learned
- D7.5: Report of the use case: Spain-Portugal
- D7.6: Report of the use case: Slovakia-Austria
- D7.7: Report of the use case: Bulgaria-Greece
- D7.8: Report of the use case: Norway-Netherlands

D7.1 : Datasets Management and Benchmarking [24]

Provides the datasets considered for training and validation purposes, and its description and analysis based on conventional AI enablers. At M24, both Report (R) and Demonstrator (DEM) will be delivered.

D7.2 : Testbeds and Evaluation Methodology [10]

This deliverable describes the testbed, validation and evaluation methodology agreed for assessing the quality of the VALKYRIES outcomes. At M10, both Report (R) and Demonstrator (DEM) will be delivered.

D7.3 : System Validation and Evaluation [18]

This deliverable describes the effectiveness of the VALKYRIES outcomes according to the validation and evaluation methodology (D7.2).

D7.4 : VALKYRIES Reference Integration and lessons learned [21]

Present the reference integrated solution for addressing the challenges described at T2.1. Includes guidelines, filed notes and lessons learned that may guide further related developments and support normalization actions.

D7.5 : Report of the use case: Spain-Portugal [24]

It describes the outcomes achieved when exercising the VALKYRIES solutions in a real demonstration between Spain and Portugal, as well as outlining the impact of the demonstration outcomes and end-user acceptance. At M24, both Report (R) and Demonstrator (DEM) will be delivered.

D7.6 : Report of the use case: Slovakia-Austria [24]

This deliverable describes the outcomes achieved when exercising the VALKYRIES solutions in a real demonstration between Slovakia and Austria, as well as outlining the impact of the demonstration outcomes and end-user acceptance. At M24, both Report (R) and Demonstrator (DEM) will be delivered.

D7.7 : Report of the use case: Bulgaria-Greece [24]

It reports the outcomes achieved when exercising the VALKYRIES solutions in a real demonstration between Bulgaria and Greece, as well as outlining the impact of the demonstration outcomes and end-user acceptance. At M24, both Report (R) and Demonstrator (DEM) will be delivered.

D7.8 : Report of the use case: Norway-Netherlands [24]

This deliverable describes the outcomes achieved when exercising the VALKYRIES solutions in a real demonstration between Norway and Netherlands, as well as outlining the impact of the demonstration outcomes and end-user acceptance. At M24, both Report (R) and Demonstrator (DEM) will be delivered.

### Schedule of relevant Milestones

Milestone number <sup>18</sup>	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS7	Testbeds and Evaluation Methodology	10 - KEMEA	10	D7.1 delivered
MS12	VALKYRIES Reference Integration and field notes, guidance and lessons learned	10 - KEMEA	21	D7.4 delivered
MS13	Demonstration in Spain-Portugal	17 - PARTICLE	24	Real demonstration, D7.5 delivered
MS14	Demonstration in Slovakia-Austria	4 - ISEMI	24	Real demonstration, D7.6 delivered
MS15	Demonstration in Bulgaria-Greece	8 - BDI	24	Real demonstration, D7.7 delivered
MS16	Demonstration in Norway-Netherlands	13 - USN	24	Real demonstration, D7.8 delivered
MS17	Rationale, Data Management Platform, datasets and final impact, exploitation and dissemination actions	1 - INDRA	24	Fourth VALKYRIES workshop on ethical, legal and standardization. D1.5, D3.6, D7.1, D7.5, D1.10 delivered.



<b>Work package number</b> <sup>9</sup>	WP8	<b>Lead beneficiary</b> <sup>10</sup>	1 - INDRA
<b>Work package title</b>	Ethics requirements		
<b>Start month</b>	1	<b>End month</b>	24

### Objectives

The objective is to ensure compliance with the 'ethics requirements' set out in this work package.

### Description of work and role of partners

**WP8 - Ethics requirements** [Months: 1-24]

**INDRA**

This work package sets out the 'ethics requirements' that the project must comply with.

### List of deliverables

<b>Deliverable Number</b> <sup>14</sup>	<b>Deliverable Title</b>	<b>Lead beneficiary</b>	<b>Type</b> <sup>15</sup>	<b>Dissemination level</b> <sup>16</sup>	<b>Due Date (in months)</b> <sup>17</sup>
D8.1	H - Requirement No. 1	1 - INDRA	Ethics	Confidential, only for members of the consortium (including the Commission Services)	6
D8.2	H - Requirement No. 2	1 - INDRA	Ethics	Confidential, only for members of the consortium (including the Commission Services)	9
D8.3	POPD - Requirement No. 3	1 - INDRA	Ethics	Confidential, only for members of the consortium (including the Commission Services)	6
D8.4	DU - Requirement No. 4	1 - INDRA	Ethics	Confidential, only for members of the consortium (including the Commission Services)	9
D8.5	M - Requirement No. 5	1 - INDRA	Ethics	Confidential, only for members of the consortium (including the Commission Services)	9
D8.6	EPQ - Requirement No. 6	1 - INDRA	Ethics	Confidential, only for members of the consortium (including the Commission Services)	15

### Description of deliverables

The 'ethics requirements' that the project must comply with are included as deliverables in this work package.

**D8.1 : H - Requirement No. 1 [6]**

The beneficiary must submit a deliverable including: - The procedures and criteria that will be used to identify/recruit research participants. - The informed consent procedures including personal data processing that will be implemented for the participation of humans. - Templates of the informed consent/assent forms and information sheets (in language and terms intelligible to the participants) including personal data processing. - Details on an incidental findings policy.

**D8.2 : H - Requirement No. 2 [9]**

Copies of opinions/approvals by ethics committees and/or competent authorities for the research with humans must be submitted as a deliverable.

**D8.3 : POPD - Requirement No. 3 [6]**

The beneficiary must submit a deliverable including: - Justification for the processing of sensitive personal data. - An explanation of how all of the data they intend to process is relevant and limited to the purposes of the research project (in accordance with the 'data minimisation' principle). - A description of the technical and organisational measures that will be implemented to safeguard the rights and freedoms of the data subjects/research participants. - A description of the security measures that will be implemented to prevent unauthorised access to personal data or the equipment used for processing. - Description of the anonymisation/pseudonymisation techniques that will be implemented. - In case of further processing of previously collected personal data, an explicit confirmation that the beneficiary has lawful basis for the data processing and that the appropriate technical and organisational measures are in place to safeguard the rights of the data subjects. - An explicit confirmation that the data used in the project is publicly available and can be freely used for the purposes of the project. - The data protection impact assessment. In addition, the beneficiary must check if special derogations pertaining to the rights of data subjects or the processing of genetic, biometric and/or health data have been established under the national legislation of the country where the research takes place and submit a declaration of compliance with respective national legal framework(s).

**D8.4 : DU - Requirement No. 4 [9]**

Details on potential dual use implications of the project and risk-mitigation strategies must be submitted as a deliverable.

**D8.5 : M - Requirement No. 5 [9]**

Risk assessment and details on measures to prevent misuse of research findings must be submitted as a deliverable.

**D8.6 : EPQ - Requirement No. 6 [15]**

The beneficiary must demonstrate that appropriate health and safety procedures conforming to relevant local/national guidelines/legislation are followed for staff involved in this project. This must be submitted as a deliverable.

**Schedule of relevant Milestones**

<b>Milestone number<sup>18</sup></b>	<b>Milestone title</b>	<b>Lead beneficiary</b>	<b>Due Date (in months)</b>	<b>Means of verification</b>
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### 1.3.4. WT4 List of milestones

Milestone number <sup>18</sup>	Milestone title	WP number <sup>9</sup>	Lead beneficiary	Due Date (in months) <sup>17</sup>	Means of verification
MS1	Kick-off celebrated, set up comm. tools and project website	WP1	1 - INDRA	1	Plenary meeting, website launch and Y1 plans agreed
MS2	Consultation Strategy and protocol for managing risks due to Covid-19	WP1	1 - INDRA	1	D1.7 and D1.8 agreed and delivered
MS3	Requirements and standardization map	WP2	16 - NOVOTEC	5	D2.1 and D2.4 delivered
MS4	Basic design principles: legal and ethical profiles, terminology and semantics, DMP, interoperability certification and harmonization strategy	WP1, WP2, WP3	16 - NOVOTEC	6	First VALKYRIES workshop on ethical legal, standardization. D1.3, D2.5, D2.6, D3.2, D2.2, D3.4 delivered.
MS5	VALKYRIES Dashboard	WP1	1 - INDRA	8	D1.11 delivered
MS6	Preliminary landscape of emerging technological, procedural, training and collaboration opportunities	WP4, WP5, WP6	3 - TASSICA SA	9	First version of D4.1, D5.1 and D6.1 delivered
MS7	Testbeds and Evaluation Methodology	WP7	10 - KEMEA	10	D7.1 delivered
MS8	Preliminary analysis of certification, regulation, standardization and harmonization opportunities of technologies, procedures, training and collaboration	WP4, WP5, WP6	6 - SSS	11	First version of D4.2, D5.2 and D6.2 delivered
MS9	Concepts of Operation and final scope of the reference integration and demonstration scenarios. Intermediate retrospective of ethical, regulatory and standardization actions	WP1, WP2	16 - NOVOTEC	12	Second VALKYRIES workshop on ethical, legal and standardization. D2.1, D2.3, D1.4, D1.6, D1.9, D1.6 updated and delivered.
MS10	Closure of the technological, procedural, training	WP4, WP5, WP6	16 - NOVOTEC	18	Third VALKYRIES workshop on ethical, legal and standardization. D4.3,

<b>Milestone number<sup>18</sup></b>	<b>Milestone title</b>	<b>WP number<sup>9</sup></b>	<b>Lead beneficiary</b>	<b>Due Date (in months)<sup>17</sup></b>	<b>Means of verification</b>
	and collaboration working streams (WP4-5-6). Local Harmonization on the selected enablers, and definition of related EU-level roadmaps				D4.4, D5.3, D6.3, D6.4 delivered. D7.3 delivered (System validation and evaluation).
MS11	Canvas analysis of outcomes and business cases	WP3	6 - SSS	20	D3.5 delivered
MS12	VALKYRIES Reference Integration and field notes, guidance and lessons learned	WP7	10 - KEMEA	21	D7.4 delivered
MS13	Demonstration in Spain-Portugal	WP7	17 - PARTICLE	24	Real demonstration, D7.5 delivered
MS14	Demonstration in Slovakia-Austria	WP7	4 - ISEMI	24	Real demonstration, D7.6 delivered
MS15	Demonstration in Bulgaria-Greece	WP7	8 - BDI	24	Real demonstration, D7.7 delivered
MS16	Demonstration in Norway-Netherlands	WP7	13 - USN	24	Real demonstration, D7.8 delivered
MS17	Rationale, Data Management Platform, datasets and final impact, exploitation and dissemination actions	WP1, WP2, WP3, WP4, WP5, WP6, WP7	1 - INDRA	24	Fourth VALKYRIES workshop on ethical, legal and standardization. D1.5, D3.6, D7.1, D7.5, D1.10 delivered.

### 1.3.5. WT5 Critical Implementation risks and mitigation actions

Risk number	Description of risk	WP Number	Proposed risk-mitigation measures
1	Less than expected performance. VALKYRIES fails to match expected KPIs.	WP1, WP2, WP3, WP4, WP5, WP6, WP7	The performance objectives will be appropriately captured in requirements producing all the appropriate technology and application extensions, solution optimisations and tuning so reliable KPIs are produced.
2	Deficient risk analysis. Some risks were not identified at the risk analysis stage.	WP1, WP2	The requirements are methodologically captured in WP2 and continually reviewed and tracked by the Consortium and stakeholders. Interactions between T1.1 and 1.5 will ensure continuous monitoring.
3	Difficulties in integrating outcomes on third-party infrastructure.	WP1, WP2, WP7	The delivery of the VALKYRIES' components will be container-based, thereby easing interoperability, which will also take advantage of APIs standardises development.
4	Unavailable external knowledge. Difficulties when accessing scientific knowledge-based or test catalogs.	WP1, WP2, WP3, WP4, WP5, WP6, WP7	A multidisciplinary approach combining desk research with empirical onsite activities will be used: analysis of case-studies and onsite observation allows to collect a wide range of information and data from complementary sources.
5	Action Points are not diligently resolved. Open issues are ignored or delayed.	WP1, WP2, WP3, WP4, WP5, WP6, WP7	The project coordinator or WP Leaders will include an activity in the implementation plan to follow-up on open issues to ensure they are resolved as soon as possible.
6	Privacy and data protection. GDPR related risks in some information processing step of the developed solutions.	WP1	These issues will be monitored and tracked through the project life cycle (T1.5). The proposal will assume privacy by design and be able to deal with them as part of the project-specific objectives. If they come from harmonization gaps, may entail normalization opportunities
7	Contingencies in normalization actions. Delays and other contingencies on when participating at regulatory and standardization actions.	WP1, WP2, WP3	WP2 and WP3 shall provide suitable plans (including contingencies) for the engagement of VALKYRIES in regulatory, standardization, certification and harmonization actions. All the delays or variations of this these participation will be registered at the periodic impact creation reports (D1.10). Critical related situations will be analysed with the RABs and, if required, presented to the PO.
8	Lack of interest and engagement from stakeholders and target audience.	WP1	Establishing contacts with relevant organisations well in advance; provision of convenient means to exchange information including brief, interviews, etc. (Consultation Strategy in D1.7); Understandable dissemination material.
9	Lack of freedom to operate an exploitation strategy.	WP3	Ensure a contractual agreement between partners based on FRAND concepts.
10	Maturity of project components: The assets	WP4, WP5, WP6, WP7	The components used in VALKYRIES belong to late and live developments and/or solutions.

Risk number	Description of risk	WP Number	Proposed risk-mitigation measures
	selected for integration may be below the required level of maturity.		For all solutions, there will be alternatives and options, producing less risky implementations adequately tested before deployment.
11	Data and information security. The confidentiality, integrity and availability of the information exchanged between components may be jeopardised.	WP1, WP2, WP7	The VALKYRIES solutions comprise services for secure authentication and authorisation, pseudo-anonymisation and secure information flows. The hardening of the project outcomes and security of communication channels will be directly addressed by task T4.5, T2.5, T4.2, including dashboards and web spaces (T1.4).
12	Testing issues. Improper tests conducted for validating VALKYRIES outcomes.	WP2, WP7	The testing and validation of the project outcomes will be conducted at different levels (component, integration and system), analytically and by consultation to experts before deployment on demonstrations.
13	Components vulnerable against cyber threats. Some components may present attack surfaces not covered by the self-protection capabilities.	WP1, WP2, WP4, WP7	The VALKYRIES project assumes security by design. The development of hardening and self-protection capabilities is one of the specific objectives of the proposal, that when combined with the scalability and expandability of the reference integrations, will allow adapting/modifying its security enablers.
14	Unreachable real-time performance. Fail to offer real-time user's experience.	WP1, WP2, WP3, WP4, WP5, WP6, WP7	Then project capabilities will be multi-layered for optimising their execution/visualisation in near real-time. To operate in real-time is assumed by design at all working streams (WP4, WP5, WP6).
15	Enablers' disruption. Changes of requirements due to technological, operational or collaboration disruptions.	WP1, WP2, WP7	The Consortium will communicate this risk to the Project Officer. Consortium meetings will be scheduled for deciding how to deal with the discovered novelties. Their impact will be assessed, and corrective actions may be conducted.
16	Unsuitability for EU response teams. Some VALKYRIES feature does not encompass all critical aspects for operating on real operations.	WP4, WP5, WP6, WP7	The Consortium has partners and EAB members representative from institutions and EU response teams, which expertise is complementary. They will take part of the system requirement analysis stage and supervise the project sustainability through its life cycle. This will cover user acceptance to real deployability on disaster scenarios.
17	Novelties in EU solution ecosystem. VALKYRIES does not consider emerging trends on mobile first aid response.	WP1, WP2, WP3, WP4, WP5, WP6, WP7	The Consortium will establish processes to continuously monitoring market developments, procedures/doctrine and technological trends. A constant interaction with stakeholders and the VALKYRIES presence on related workshops/events will allow identifying the achieved novelties and adapt project development to them.
18	Contextual incoherency. The validation and evaluation of the project results could	WP2, WP7	At the requirement analysis (task T2.1), the Consortium will identify contingency sources and adapt the developed solutions to general-

Risk number	Description of risk	WP Number	Proposed risk-mitigation measures
	be affected by contextual features.		purpose contexts. Properly report the observations regarding changes at the operational domains.
19	Conditioning changes in demonstrations. Weather, political decisions, availability of committed end-user, etc. may lead to a re-scheduling of the demonstrators.	WP1, WP2, WP7	Communicate the situation to the Project Officer and all the parties involved in the affected on the demonstration. Adapt the demonstration to the new conditions: re-scheduling, changes in the committed parties, changes in the scope of the demonstration capabilities, etc. If a demonstration delays may compromise the project timing, to agree with the EC the most suitable solution.
20	Closing the novelty gaps. Some participant parties may encounter difficulties in acquiring the skills for properly test and/or evaluated a project feature.	WP1, WP6, WP7	During the task T6.2 methodologies and tactics for education and training first responders on the disruptive technological, procedural or collaborative changes will be revised, introduced and harmonized. If the capacitation process may compromise the commitment of the affected party on such actions, alternative stakeholders may be invited as support/replacement.
21	Failure to (or limited) access to the facilities used for the demonstration.	WP1, WP2, WP7	All participants will provide guarantee the required accessibility to the capabilities, infrastructure and facilitate to be taken into consideration at the demonstration. The conditions will be detailed at the project Grant Agreement.
22	Resource shortage. Lack of resources for acquiring COTS licences, hiring, etc.	WP1	Communicate the situation to the Project Officer. To assigning new resources into the project under a previously agreed between the partners, that this may be internally funded or supported by the EC.
23	COTS variations. Licence changes, SW/HW compatibility varies.	WP1	The proposal will be scalable, expandable and interoperable by design, so it will allow replacing, modifying or removing some of the COST components. Major IP related issues will be addressed to the PO.
24	Partner related risks. Underperforming partners, leaving the project, key-personnel not available, etc.	WP1	The project management structure and Consortium Agreement allow a quick shift of resources to alternative project partners and allow quick inclusion of new partners if necessary. Consortium partners are involved with more than one contact person, ensuring immediate substitution.
25	Timing problems. Project timing not appropriate, milestones delayed, etc.	WP1	Involvement of other partners with available resources, rearrangement of resources among partners, change of the project plan within the self-assessment activities and EC if needed, and feasible planning.
26	Collaboration issues. Consortium cannot agree, WP interaction not satisfactory, coordination not efficient, etc.	WP1	The project management provides appropriate decision making and conflict resolution procedures. As the last instance, management of the affected organisations, including the coordinating organisation, will be involved in resolution.

<b>Risk number</b>	<b>Description of risk</b>	<b>WP Number</b>	<b>Proposed risk-mitigation measures</b>
27	Impact of Covid-19	WP1, WP2, WP3, WP4, WP5, WP6, WP7	D1.8 will deliver an actuation protocol for Covid-19 (see Section 2.1.4)
28	Governance structure is not efficient and/or produces unexpected side-effects.	WP1	The reconstruction of the affected structure will be discussed and agreed on the VALKYRIES General Assembly with the support of the EAB, being communicated to the PO and requesting the amendment of the Grant Agreement



### 1.3.6. WT6 Summary of project effort in person-months

	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	Total Person/Months per Participant
1 - INDRA	18	2	22	2	4	10	5	✓	63
· IFT	22	2	2	16	2	0	8		52
2 - SERMAS	0	2	1	6	6	3	14		32
· FIIBAP	6	5	2	4	2	4	7		30
3 - TASSICA SA	7	6	9	10	22	9	9		72
4 - ISEMI	4.50	1.50	5	3	5	5.50	12		36.50
5 - UMU	4	6	6	26	8	6	14		70
6 - SSS	11	5	28	8	4	6	8		70
7 - BC2050	1	8	0	25	0	6	24		64
8 - BDI	5	2	11	0	8	12	14		52
9 - BRC	3	2	5	2	9	22	18		61
10 - KEMEA	6	6	5	2	4	4	24		51
11 - HESE	5	5	8	6	1	6	19		50
12 - ARATOS.NET	1	7	0	10	21	0	31		70
13 - USN	10	5	12	11	1	1	12		52
14 - AREU	4	4	0	16	15	8	8		55
15 - HRT	1	5	2	0	6	5	10		29
16 - NOVOTEC	9	21	24	4	2	2	4		66
17 - PARTICLE	1	14	4	15	6	2	19		61
<b>Total Person/Months</b>	118.50	108.50	146	166	126	111.50	260		1036.50

### *1.3.7. WT7 Tentative schedule of project reviews*

<b>Review number <sup>19</sup></b>	<b>Tentative timing</b>	<b>Planned venue of review</b>	<b>Comments, if any</b>
RV1	12	TBD	TBD
RV2	24	TBD	TBD

### 1. Project number

The project number has been assigned by the Commission as the unique identifier for your project. It cannot be changed. The project number **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

### 2. Project acronym

Use the project acronym as given in the submitted proposal. It can generally not be changed. The same acronym **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

### 3. Project title

Use the title (preferably no longer than 200 characters) as indicated in the submitted proposal. Minor corrections are possible if agreed during the preparation of the grant agreement.

### 4. Starting date

Unless a specific (fixed) starting date is duly justified and agreed upon during the preparation of the Grant Agreement, the project will start on the first day of the month following the entry into force of the Grant Agreement (NB : entry into force = signature by the Agency). Please note that if a fixed starting date is used, you will be required to provide a written justification.

### 5. Duration

Insert the duration of the project in full months.

### 6. Call (part) identifier

The Call (part) identifier is the reference number given in the call or part of the call you were addressing, as indicated in the publication of the call in the Official Journal of the European Union. You have to use the identifier given by the Commission in the letter inviting to prepare the grant agreement.

### 7. Abstract

### 8. Project Entry Month

The month at which the participant joined the consortium, month 1 marking the start date of the project, and all other start dates being relative to this start date.

### 9. Work Package number

Work package number: WP1, WP2, WP3, ..., WPn

### 10. Lead beneficiary

This must be one of the beneficiaries in the grant (not a third party) - Number of the beneficiary leading the work in this work package

### 11. Person-months per work package

The total number of person-months allocated to each work package.

### 12. Start month

Relative start date for the work in the specific work packages, month 1 marking the start date of the project, and all other start dates being relative to this start date.

### 13. End month

Relative end date, month 1 marking the start date of the project, and all end dates being relative to this start date.

### 14. Deliverable number

Deliverable numbers: D1 - Dn

### 15. Type

Please indicate the type of the deliverable using one of the following codes:

R	Document, report
DEM	Demonstrator, pilot, prototype
DEC	Websites, patent filings, videos, etc.
OTHER	
ETHICS	Ethics requirement
ORDP	Open Research Data Pilot
DATA	data sets, microdata, etc.

#### 16. Dissemination level

Please indicate the dissemination level using one of the following codes:

- PU Public
- CO Confidential, only for members of the consortium (including the Commission Services)
- EU-RES Classified Information: RESTREINT UE (Commission Decision 2005/444/EC)
- EU-CON Classified Information: CONFIDENTIEL UE (Commission Decision 2005/444/EC)
- EU-SEC Classified Information: SECRET UE (Commission Decision 2005/444/EC)

#### 17. Delivery date for Deliverable

Month in which the deliverables will be available, month 1 marking the start date of the project, and all delivery dates being relative to this start date.

#### 18. Milestone number

Milestone number: MS1, MS2, ..., MSn

#### 19. Review number

Review number: RV1, RV2, ..., RVn

#### 20. Installation Number

Number progressively the installations of a same infrastructure. An installation is a part of an infrastructure that could be used independently from the rest.

#### 21. Installation country

Code of the country where the installation is located or IO if the access provider (the beneficiary or linked third party) is an international organization, an ERIC or a similar legal entity.

#### 22. Type of access

- TA-uc if trans-national access with access costs declared on the basis of unit cost,
- TA-ac if trans-national access with access costs declared as actual costs, and
- TA-cb if trans-national access with access costs declared as a combination of actual costs and costs on the basis of unit cost,
- VA-uc if virtual access with access costs declared on the basis of unit cost,
- VA-ac if virtual access with access costs declared as actual costs, and
- VA-cb if virtual access with access costs declared as a combination of actual costs and costs on the basis of unit cost.

#### 23. Access costs

Cost of the access provided under the project. For virtual access fill only the second column. For trans-national access fill one of the two columns or both according to the way access costs are declared. Trans-national access costs on the basis of unit cost will result from the unit cost by the quantity of access to be provided.



The EU Framework Programme  
for Research and Innovation

# HORIZON 2020



## Annex I to the Grant Agreement (Description of the Action)

H2020

Research and Innovation Actions (RIA)  
Innovation Actions (IA)  
Coordination and Support Actions (CSA)

Version 2.0  
24 February 2021

## History of changes

Version	Date	Changes
2.0	28.01.2021	<p>Changes to the content of the document:</p> <ul style="list-style-type: none"> <li>▪ <b>PARTICLE</b> undertake the obligations of <b>EDGEENGINEERING</b>: PARTICLE is a SME, a spin-off of EDGEENGINEERING, created to manage the security business area, in the interest of having business focus and enhanced competitiveness. As a result, EDGEENGINEERING is in the process of transferring all security-related projects (and associated key staff resources) from EDGEENGINEERING to PARTICLE.</li> <li>▪ <b>NOVOTEC</b> undertake the obligations of <b>APPLUS</b>: Novotec Consultores, S.A., is a company belonging to the Applus Group. The people who are going to participate in the Valkyries project are contractually bound to the Novotec company, so it seems coherent to communicate and make this change, in order to eliminate possible future complications in justifying the dedications and expenses of human resources involved in the project.</li> </ul>

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# 1. EXCELLENCE

The emergency medical system has a unique role when deployed as first aid response on disaster situations, where Multi-Casualty Incidents (MCI) tend to reveal resource insufficiency (rescue personnel, healthcare providers, facilities, etc.), significant breakdowns in the local health care facilities (usually damaged, destroyed, etc.), malfunctioning communication infrastructure and the jeopardized ability to deliver additional resources. This picture resembles Beyond the Light of Sight (BLOS) scenarios with strong personal and ethical implications, where rescue workers and health care personnel may become direct or indirect victims (e.g., affected familiars); and where fast but critical decisions may prioritize the majority over the individual, as is the case of deciding those victims with little chance of survival who require large amounts of resources, will not be attended to as this will take away from the care for many more patients. Although the EU has evolved towards bringing strong capabilities for joint coordination and cross-sectorial cooperation between Member States (MS), studies like the EU Mandate M/487 to Establish EU Security Standards reveal **significant open issues and gaps concerning the standardization and harmonization of common procedures focalized at semantic, planning, resilience and organizational interoperability aspects, most of them being addressed from a holistic approach, but overlocking the needs of the local and pan-European Emergency Medical Services (EMS) at first responses, at the same time that weakly placing values on technological, procedural, collaborative and educational emerging opportunities arriving at the EU Security Market**, which is highly fragmented and entails strong social implications. Echoed by these needs, the project VALKYRIES (*Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters*) aims to **analyse, improve and demonstrate infrastructures, protocols and data exchange standards to increase efficiency during the deployment, intervention and local/remote coordination of first aid responders in multi-victim disasters, including crowdsourcing and public alerting to the population**. The proposal targets the Sub-topic3 “First aids vehicles deployment, training, maintenance, logistic and remote centralized coordination means” of the call SU-DRS03-2018-2019-2020, “Pre-normative research and demonstration for disaster-resilient societies.” Against this background, and assuming the priorities highlighted in M/487 concerning the existing gaps on emergency response Principles to ease interoperability, Incident management, Organisational interoperability, C&C interoperability, Preparedness and Operational efficiency, H2020-VALKYRIES brings a set of **average TRL 7 solutions** for enhancing standardisation of the EU capabilities for joint disaster resiliency.

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**In support to the need for harmonising the emerging technological, procedural and collaborative opportunities growing in the EU research, innovation and commercialisation ecosystem concerning the operation of first aid vehicles at cross-frontier disaster response, VALKYRIES will analyse, improve and develop infrastructures, protocols and prompt data exchange standardisation and harmonisation tactics able to increase the effectiveness and interoperability in these emergency situations. Through the project, rational-reasoning based tactics for tracking and analysing the needs for related standardisation, regulation, certification and harmonisation will be explored, which will be applied to the existing solutions aiming at closing the regulatory and acceptance gaps of the opportunities derived from the digitalization of the sector; thus strengthening the sustainability and competitiveness of the EU markets.**

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VALKYRIES will map, identify communities, analyse the regulatory and normalization issues in the targeted opportunities, and suggest roadmaps for their mitigation and prompting the adoption of the disruptive solutions on the first aid response markets. This will be achieved by developing three core blocks with their corresponding working streams: **Technologies and Equipment for first aid responders (KARA), Procedures and Operation for first aid responders (HERJA), and Collaboration and Training for first aid responders (EIR)**. At the early stage of the project, the committed end-users and institutions together with the Consortium and external advisors will prioritize the studied needs, selecting a subset of them for guiding a reference harmonization and integration of some of the targeted opportunities. This will result in the SIGRUN interconnected platform.

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**SIGRUN will reference harmonize and integrate some of the analysed opportunities towards delivering a cognitive communications and resource federation platform for C&C at first aid responses in MCI. Among others, SIGRUN will include tactical command and control systems and**

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**services; and a mobile application able to public alerting/warning and crowdsourcing a common operational picture.**

The reference harmonisations and interconnections of SIGRUM implement the VALKYRIES harmonization tactics thorough their life cycle, resulting in recommendations, field notes, and guidelines for assisting the community in further related harmonisations. **This process will be supervised by the Consortium's end-users/practitioners, External Advisory Boards, and a large ecosystem of external stakeholders to be attracted by the project Consultation Strategy. The results will be validated, verified and demonstrated at cross-border scenarios in Spain-Portugal, Bulgaria-Greece, Slovakia-Austria and Norway-Netherlands.**

Beyond the commercialization potential of the reference harmonization and the SIGRUN solution, the main impact expected by VALKYRIES is to get involved at National-European-International ongoing/planned standardization and harmonization actions. Therefore, the Consortium will get (in-)directly involved in different working groups of regulatory standardization bodies/initiatives. The contribution may range from bringing VALKYRIES' vision, until triggering novel pre-standardization and regulatory actions. The pre-standardization actions to be prompted are expected to cover standardization gaps identified on the conducted analysis of first aid response opportunities, but may also derive on normalizations concerting the applied methodologies (i.e., VALKYRIES harmonization tactics, guidelines for developing large-scale joint exercises for disaster management, evaluation methodology, etc.).

## 1.1. Objectives

VALKYRIES will address the challenges mentioned above by developing **cutting-edge advances to support the standardisation and harmonisation of first aids vehicles deployment, training, maintenance, logistic and remote centralized coordination means** for effective deployment of resources during the run-up to a major crisis related to any kind of disaster (natural or intentional) that demands the fast actuation and coordination of health emergency services and the associated response teams, with Civil-Military Cooperation (CIMIC) and volunteering. The project will cover the Disaster Management life cycle [AKT19] with a clear focus on **enhancing the capabilities of the EU market and R&D initiatives to bring harmonised mitigation, preparedness, response and recovery advances towards achieving and increasing EU disaster resilience.**

**The primary objective of the VALKYRIES project is to develop, implement, validate and apply innovative theoretical foundations, methods, prototypes and their demonstration on a reference integration for supporting the ongoing/planned European actions for pre-standardisation and harmonisation technologies, procedures, preparedness and cross-sector/border cooperation for first aid response at disaster management by emergency health services, with the focus on their vehicular deployments.**

To achieve this primary objective and address the challenges identified above, VALKYRIES establishes **9 specific and measurable objectives** that are introduced below. An exhaustive analysis of solutions, as well as the main challenges on which VALKYRIES focuses, aligned with the following objectives, are discussed in Section **¡Error! No se encuentra el origen de la referencia..** The **measurable outcomes and quantified targets** per objective *OBJ-x* are widely described in Section **¡Error! No se encuentra el origen de la referencia..**

**OBJ-1 (Map of growing commercial and R&D opportunities): Analyse the existing/ongoing technological, procedural, education and collaborative opportunities of the first aid response supplier markets and related signs of progress beyond the state-of-the-art able to improve the EU disaster resiliency**

The rapid proliferation of the emerging ICT paradigms revealed a plethora of innovative and disruptive solutions able to significantly enhance the effectiveness of the existing EU Emergency Medical Services (EMS), which are expected even to play a major role when first responding against national and/or cross-border disaster situations. In this context, potential contributions of novel technological approaches like introducing social media intelligence to improve the EMS preparedness, taking advantage of AI-based predictive Big Data analytics for guiding anticipatory actions, bringing auxiliary unmanned vehicles and autonomous driving capabilities to the conventional first aid scenarios, exploring the potential of the emerging communication paradigms, digitalisation/virtualisation; inherently demand a review of their linked operational procedures, education, training and cross-sectorial collaboration. Nowadays, there is not a complete map in compliance with the EU vision, able to identify the opportunities in the

growing R&D and markets that reflect the cross-domain implications (technology, procedures, collaboration) of their potential adoption, and the vertical/horizontal potential propagations of their adoption risks.

**Expected VALKYRIES contributions:** As a preliminary stage of the VALKYRIES project, the large ecosystem of emerging opportunities for enhancing the first aid actuation in disaster situations will be surveyed, analysed and categorised resulting in an ontological map of the existing state-of-the-art and beyond enablers, and the pros/cons of their adoption. The study will be supported by committed external advisory panels and the direct consultation to the key pan-European players regarding their sector or interest, thus expecting to settle a baseline for guiding further research, innovation and normalisation actions (pre-standardisation, regulation, etc.), where divergences, overlappings and end-user requirements will be emphasised. Tentative EU-level roadmaps for their adoption will be proposed, which beyond previous studies will correlate the cross-domain implications of their deployment (e.g., the normalisation of autonomous driving enablers may imply variations in the required ambulance crew skills, training and actuations protocols), bearing in mind the particularities of each disaster situation (natural, technological, intentional) and effects (impact, cascading impacts –both short- and long-term opportunities, etc.) on each stage of the EMS-centred Disaster Management cycle (mitigation, preparedness, response and recovery).

**OBJ-2 (Sustainable Regulation and ethical compliance): Analyse the first aid response cross-sector, cross-border and cross-hierarchy regulatory and ethical principles, identifying minimum standard requirements, lacunae and hurdles, and developing recommendations to policymakers and stakeholders to facilitate their enforcement through the consolidation of a harmonised regulatory framework and the implementation of new strategic schemes.**

Responsible innovation in current continuous digitalisation refers to a comprehensive approach aiming to integrate knowledge related to the operational environment, but also about stakeholders operating at both the demand and the supply side of digitalisation outcomes. The advances in research and innovation on first aid response will have sustainable success only if ethical, societal and commercial impacts are adequately considered in light of the applicable EU legal framework. And to support real-time decision-making, the deployment of first aid actuations depends more and more on sharing data as a key asset, which may reveal from personal habits, preferences or human behaviours, to classified strategic information managed by response authorities. Beyond the significant regulatory challenges inherent in the emerging technological, procedural and collaborative enablers, the definition of a cross-border, cross-sectorial and cross-domain vision aiming at harmonising capabilities, requires a careful analysis regarding how disrupting EMS solutions may affect cross-cutting factors, such as dependant protocols, preparedness processes or how they overlap with foreign regulations of assistant response teams [JAS17].

**Expected VALKYRIES contributions:** Throughout VALKYRIES' implementation, all Ethical Legal and Societal Aspects (ELSA) relevant in the context of acquiring information and introducing novel capabilities for first aid response on disaster settings will be identified, including privacy, autonomy/freedom of choice/expression, non-discrimination, copyright, tort, contract law, etc., and their interplay with cross-sector law, land law and regulations, with emphasis on those aspects concerning to pan-European cross-border situations. It is expected that legal compliance will help to ensure social acceptance of the EMS solutions to be supplied by the EU markets. A complete ethical, legal and social analysis will be performed to draft the requirements for balanced ELSA between the benefits of the supplied capabilities for disaster resiliency, against the risk posed by the employment of such technologies with other fundamental rights. In this context, hard and soft law regulatory frameworks relevant to the development of innovative standardisation and certification solutions for disaster management will be studied, including those concerning data protection and IP boundaries. Besides, beyond a mere compliance assessment, VALKYRIES will provide, following an integrated approach related to different branches of EU law, new regulatory solutions for the maximisation of interaction, exchange and interoperability capabilities of both subjects and technologies involved in EMS. The analysis will result in a set of minimum standard regulatory requirements, recommendations for policymakers and stakeholders, and the engagement of the VALKYRIES partners on regulation initiatives derived from the project development (either by bringing the VALKYRIES vision to regulatory committees and actions or by prompting new issues).

**OBJ-3 (Sustainable Pre-standardisation and Standardisation): Research and analyse the pre-standardisation opportunities concerning the first aid response enablers, resulting in recommendations, common requirements, guidelines and enforcement tools towards constituting a novel and sustainable reference model, being implemented at new standardisation actions.**

Crisis management implies networking and communication with all the stakeholders and the general public, where the interoperability is critical, and maybe a strong cross-sector, cross-border and/or cross-hierarchy coordination is needed. Despite relevance, recent studies such as the EU Mandate M/487 to Establish EU Security Standards revealed that the Union is not yet at a stage where responders can interconnect information management systems from different organisations to share situation assessment or automate coordinated response procedures. For several reasons there is usually no willingness to establish direct interconnection, but rather a need to utilise human interfaces between systems [TRO20]. This understanding means that technical solutions should be incremental solutions, in a step by step approach, as enablers of communication needs, and require training and experiment. This also propagates in terms of doctrine, procedures, organisation and responsibilities definitions of public agencies that are under Member State control, through the national legal frameworks and guidelines, in the application of the subsidiarity principle. Among others, the deployment of first aid units demands specific standardisation actions towards acquiring digital

information from victims/public and sending it to the whole C&C system. Another important challenge is the gap of standards for patient-management in mass casualty incidents (e.g., minimal dataset for patient-management in mass casualty incidents, management of data of affected persons, which shall duly take into account privacy issues and personal data equipment), which shall incorporate new opportunities). They advance towards closing the gap in (inter)national pre-hospital patient-management with differing standards.

**Expected VALKYRIES contributions:** A great effort towards facilitating the standardisation of technologies, procedures and collaborative approaches for first aid response on crisis and disaster situations will be conducted. As part of the project pre-standardisation actions, a comprehensive overview of the current standardisation landscape related to disaster management with extends preliminarily efforts (EU Mandate M/487) by focusing on the singularities of the cross-border, cross-sectorial and cross-hierarchical first aid vehicular actuations will be developed, which will assume existing and planned standards. Together with the identification and end-user needs, the global gaps, challenges and opportunities shall be revealed. Based on this study, VALKYRIES' partners will work to identify current standardisation needs and define detailed scope for a standard applicable to discovered opportunities and gaps. At the proposal stage, the partners have identified the following areas that require at least revision (in compliance with the ISO/IEC Guide 2:2004): basic (wide-ranging coverage for novel solutions), terminology (glossaries, symbols, language), testing (linked to certification), products (requirements and quality for supplying the EU markets), processes (protocols, operations, doctrine...) and services (directly linked to the emerging technological ecosystem). In the course of the project, the partners will work at assembling draft standards or suggesting modifications of the existing ones for solving the gaps and harmonisation issues found during the reference integration and demonstrations, which will add project findings and lessons learned; they will be submitted to the interested bodies for revision. Finally, a roadmap with a pre-standardisation reference model will schedule and prioritise the identified opportunities beyond the work programmes of the European, international and military organisations, developing a sustainable process to improve future standardisation.

**OBJ-4 (Sustainable certification and conformity assessment criteria): Analyse the accreditation and certification opportunities concerning the first aid response enablers, including the enforced conformity assessment criteria, evaluation procedures and facilities; resulting in recommendations, guidelines and strategies to prompt sustainable certification, accreditation and homogeneity assessment.**

As highlighted by the EC in Mandate M/487, the security market in Europe is a highly fragmented and institutional market with a strong societal dimension. Among others, the fragmentation is proliferated by the lack of standardisation and harmonised certification and with a strong societal dimension, because it is most likely that whatever is developed touches citizens in some way. Concerning first aid responses, it is expected that cross-border and cross-sectorial certification and quality control may be formalised and harmonised, so their continuing performance is ensured. Beyond the harmonisation needs, the appearance of disruptive equipment, protocols and procedures derives in need to regulate, standardise and hence certify their compliance. They shall cover from pure technological issues to the certification of personnel that may be involved in the response, the latter covering from their skills for managing new capabilities, to the different levels of information they can access when sharing data with cross-sectorial responders. The growing certifications come along with new tests, conformity assessment criteria and modifications on the evaluation facilities, which rapidly are defining a large ecosystem of certification-related gaps, challenges and opportunities to be mapped [MAR19].

**Expected VALKYRIES contributions:** VALKYRIES will support pan-European accreditation and certification activities among others by: 1) developing a map of international/European related certification initiatives; 2) liaising with European and national first aid EMS accreditation/certification authorities; 3) exploring the gaps and requirements to adapt the existing evaluation facilities to the disrupting innovations, resulting in procedures and recommended actions for mitigation; 4) producing recommendations to develop new capabilities, harmonisation and integration, on which the Consortium experts and supportive external advisory board will imbue all cross-sectorial, cross-hierarchy and cross-border perspectives; and 5) reviewing existing conformity assessment criteria looking for intersections, gaps and hurdles concerning harmonisations and certify novel solutions. Certifications/accreditation needs may range from faculties, technologies, procedures, tests, etc., up to human-related aspects, as is the case of the skills considered for educators/trainers or accreditations.

**OBJ-5 (Sustainable Harmonisation framework): Development of a holistic framework for supporting the standardisation/harmonisation of first aid response enablers assuming their cross-sector, cross-border and cross-hierarchy hybrid dimensions, bearing in mind the vertical/horizontal propagation of consequences of the decisions made between technical, procedural and collaborative domains.**

The hidden costs of inefficient regulation and lack of harmonization are increasing as the competition in global markets intensifies. In sectors characterized by rapid technological change or high international mobility, as is the case of those covered by the EU Security markets, failure to harmonize can disadvantage entire economic sectors or lead to pressure for costly supports and protectionist policies; while also difficulty the cross-border, cross-sectorial and cross-hierarchical operability of the EMS enables. All governments have a continuing responsibility to review their capabilities to ensure that they promote efficiently and effectively the economic and social well-being of their people [OECD97], thus resembling valuable assets for increasing the Union disaster resiliency. But despite its relevance, the EC pointed out significant gaps in the harmonization of solutions for disaster management, highlighting those that concern the EMS and the Union first aid response capabilities under multi-casualty situations [ECM13].



Hence it is required that in the short term they reduce the time to market (eliminating undue or country-specific requirements, providing transparent requirements, etc.), reduce the time to market (establishing a uniform international regulatory system, reducing contradictions, etc.), facilitating cooperation among regulators-industry, creating common requirements or establishing common and transparent premarket evaluation.

**Expected VALKYRIES contributions:** VALKYRIES will introduce, enforce and validate an OODA-based harmonization method able to fast and efficiently react against disruptions on the first aid response related emerging technological, procedural and collaborative landscapes. By embracing the rational decision-making paradigm, convergence-divergence analysis and future thinking paradigms will be adapted to the particularities of the sectors, transversally increasing the flexibility, usability and commitment of stakeholders on the harmonization process, being applicable at the thorough capability development and maintenance life cycles, in this ways allowing to identify and assess related harmonization gaps and opportunities quickly. The process will cover all rational of all the hybrid aspects (Political, Military, Economic, Social, etc.) that were identified concerning the trade-offs made within decision process, and the potential impact at all domains will be inferred. Based on this, use case driven harmonisations will be conducted on the enabling opportunities identified and normalized during the reference integration, being this process properly documented, tracked resulting in guidelines, field notes and lessons learned.

**OBJ-6 (*Harmonisation of vehicular first aid technologies, procedures and collaboration*): Research, analyse and apply the VALKYRIES' recommendations, guidelines and harmonisation tactics on reference equipment, technologies, procedures, preparedness, raise awareness and related collaborative solutions.**

The rapid proliferation of the digitalisation of the society brings a plethora of disruptive opportunities with the potential to increase the effectiveness of the first aid actuations driven by EMS vehicles, which also impact on their capabilities for collaborating with cross-sector and cross-border assistant teams. For example, the ETSI-defined Multi-access Edge Computing (MEC –formerly Mobile Edge Computing) for 5G connected vehicles enables real-time and context-aware collaboration between response teams [LAM19], among others facilitating the implementation of emergency routing protocols for Vehicular Ad-hoc Networks (VANET) to support optimal healthcare responses. In this context, the automatism is postulated as an essential pillar, allowing autonomous ambulance management from basic context-aware reconfigurations to unmanned driving or autonomous fleet operation [FAK19]. The innovation shall coexist with the traditional and legacy procedures, which also suffer significant harmonisation gaps and hurdles. It is expected that the current first aid equipment evolves towards taking advantage of the most outstanding advances in Artificial Intelligence (AI) and operational research, thus supporting human decision-making in almost every situation and inferring a direct dependency between the technological novelty and the operational level; the latter requiring a revision that shall cover from preparedness (training given skills, the substitution of obsolete preparedness tasks, etc.) to how the response team acquires situational awareness, shares information (including the development of the Common Operational Picture (COP)) or manages C&C. This results in a large ecosystem of opportunities that shall be harmonised to derive in EMS solutions distributable at pan-European markets.

**Expected VALKYRIES contributions:** Research, analyse and apply VALKYRIES' recommendations, guidelines and harmonisation tactics on reference equipment, technologies, procedures, preparedness, raise awareness and related collaborative solutions. The VALKYRIES Consortium will facilitate the understanding of the growing map of technological, procedural and collaborative opportunities by surveying, studying and analysing the core focus of innovation directly adaptable to assist the EMS vehicles at first aid actuations. In close collaboration with the end-user partners and the stakeholders within the external advisory panels, the enforcement of the preliminarily defined VALKYRIES' strategies for regulation, certification and standardisation will result in recommendations, guidelines and harmonisation tactics for their accommodation to the EU markets, being adapted to each capability group. Some of them being selected as the baseline for the project's reference integration. The technological/equipment opportunities will focus on the working streams detailed in Section 1.3.1.

**OBJ-7 (*Cross-sectorial collaboration, civilian protection, volunteering and military assistance*): Research, analyse and expand the harmonisation framework towards facilitating, guiding and enhancing the cooperation between vehicular first aid responders with other disaster management actors, among them firefighters, law enforcement agencies, civilian protection, military or heterogeneous volunteering.**

The Mandate M/487 revealed that there is a critical gap concerning the pan-European capabilities for EMS-related first aid collaborative management, which among others demands to conduct direct contacts at the right hierarchical levels that would allow knowing the people, exchanging liaison officers and identifying the types of information to exchange; towards achieving effective coordination in a cross-border, cross-sector, multi-hierarchy, public and private context for situation assessment, response decisions and communication policy to the public. The existing shortcomings are manifested from the basis of the collaboration, ranging from the need of sharing a common cross-border definition of commonly used terms (extending ISO 22300) within one organisation or one country, to harmonise the national and European education and training activities on how to run simple exercises and to involve citizens, communities and organisations to increase community resilience [WHO19]. The need for multi-agency and common cross-border training programs (share best practices, networking, get to know each other, continuous improvement) has been highlighted by the related EU working groups, which is expected to align and particularise the developments from ISO 22398 (guidelines for exercises). As a result, it is expected a significant increase in the

efficiency of cross-border multi-victims' preparedness and management (victims' data, patient management, rapid triage, etc.), and better cross-border evacuation and cross-sectorial cooperation.

**Expected VALKYRIES contributions:** VALKYRIES will analyze the cross-sectorial, cross-hierarchical and cross-border collaboration opportunities, resulting in normalization recommendations and a reference collaboration model for mobile-first aid responses which shall extend the generic description of missions, responsibilities, functions, structure, etc., together with a semantic model and interfaces with the outside world (general public, NGOs), not to serve as a standard but to facilitate further related standardisation activities. With this purpose, the existing capabilities for resource federation and trusted information sharing will be reviewed, emphasising the role of the emerging paradigms and their implications in the current mitigation, preparedness, response and recovery procedures. Reference harmonized solutions for joint education and training will be reference developed, which will second an analysis of the existing capabilities, debriefing principles for first aid relate pan-European exercises and cross-border crises supported by recent technological and procedural tools (hyper-realistic simulations, learning analytics, etc.). The significance of raising public awareness for preparedness and active participation in the mitigation and recovery phases will be explored, framing related common procedures and ICT enablers; which shall be extended up to the enforcement of good habits and practical recommendations on the deployed EMS personnel. Finally, the model will explore Civil-Military Coordination (CMCoord) as a necessary capability to protect and promote humanitarian principles, avoiding competition between civilian and military capacities, minimise inconsistency and pursue common goals.

**OBJ-8 (Reference integration and interoperability): Reference integration and interoperability of the harmonised technological, procedural and collaborative solutions based on the common requirements and gap mitigations prioritised by the committed end-users and practitioners.**

As highlighted by the EC in the final communication concerning the implementation strategy of the European Interoperability framework, the interoperability depicts a key factor in making a digital transformation possible, including legal, organisational, data/semantic and technical aspects to be covered; which only is possible with the active involvement of all actors through the whole capacitation life cycle [ECC17]. On these grounds, the capacitation and refinement of the existing and forthcoming first aid EMS solutions demands, beyond the definition of conventional abstract reference models and guidelines, reference integrations and harmonisation concerning the regulatory, standardisation and certification aspects on related equipment, procedures and collaborative paradigms. They shall be extending the theoretical conceptualisation up to practical actions and demonstrations, which may allow cross-sectorial stakeholders (with an emphasis in EMS end-users and practitioners) to observe, understand and assess the potential benefits more effectively, operability and challenges derived from the introduced concepts and practices; in the same way that their acceptance of introducing disruptive solutions and methodologies increases.

**Expected VALKYRIES contributions:** The theoretical and abstract conceptualisations, models and framework introduced by VALKYRIES will be reference integrated for facilitating their verification and supporting demonstration, resulting in the SIGRUN Platform; which as described in Section 1.3.1 shall explore the identified opportunities towards bringing cognitive communications and resource federation for C&C at first aid responses in MCI. Build on a subset of requirements preliminarily prioritized by the VALKYRIES committed end-users at T2.1, it expected that SIGRUN should provide tactical command and control systems/services; and a mobile application able to public warning and crowdsourcing a common operational picture. This reference integration will encompass all the related organisational views (experts, designers, developers, practitioners, evaluators, etc.), defining all the entities and relationships involved, and embracing high-level technical, operational and contextual agnosticism (e.g., problem space, cross-border issues, disaster to be managed, etc.). End-users, practitioners and external expert will supervise the SIGRUN integration, validation and demonstration, deriving in field notes, guidelines, practical recommendations for further related actions.

**OBJ-9 (Large EU scale cross-border demonstrations): Evaluation and demonstration of the interoperability and enhancements derived from harmonising vehicular first aid related enablers at four cross-border and cross-sectorial scenarios: Spain-Portugal, Slovakia-Austria, Bulgaria-Greece and Norway-Netherlands.**

The primary objectives in modern Verification and Validation (V&V) are to identify and help resolve problems early in a solution's development life cycle. In the case of the harmonisation outcomes, at least the following actions should be required before their deployment on real operational environments: to demonstrate their technical correctness, including safety and security; to assess the overall quality of the proposals and verify their consistency with the proper measure metrics; being able to ensure their compliance with the end-user expectations, a mandatory condition for facilitating future landing on the EU markets. The Verification phase (influencing practices, products and standards) shall allow receiving feedback in the form of demonstration of the results, alternative approaches or new reference implementations. This phase will include events with end-users, gathering new requirements and evidencing potential regulatory compliance issues. But to conduct large-scale demonstrations it is required the implication of heterogeneous actors, which entail a complex mobilisation not only of EMS first aid staff and equipment, but also other response teams, which despite their relevance, makes them costly and uncommon.

**Expected VALKYRIES contributions:** As part of the VALKYRIES project, four large-scale pan-European demonstrators will be conducted. Scheduled at the later stages of the project, the demonstrators will present to the audience the outcomes of the certification, regulation, standardisation and harmonisation activities, as well as the enhancement potential derived from combining disruptive solutions with legacy capabilities in the SIGRUN platform.

In this context, a set of use case driven selected sets of technologies, procedures and solutions will be harmonised and deployed on kinetic cross-border environments, where the Consortium's end-users and practitioners, assisted by local associated responses teams, will show results. The demonstration scenarios are widely in Section 1.3.1 and located in Spain-Portugal, Bulgaria-Greece, Slovakia-Austria and Norway-Netherlands.

## 1.2. Relation to the work programme

VALKYRIES responds to the call SU-DRS03-2020, subtopic 3 "First aids vehicles deployment, training, maintenance, logistic and remote centralized coordination means." How VALKYRIES contributes to each of the specific call challenges can be summarised as follows.

**Specific Call Challenge:** *Innovation action on "First aids vehicles deployment, training, maintenance, logistic and remote centralized coordination means."*

**Specific Call Challenge:** *"A reason for the difficult interaction among practitioners, and for the low levels of interoperability of equipment and procedures implemented by first responders, lies in there being insufficient harmonisation and standardisation, which pre-normative research and demonstrations may address effectively."*

A key purpose of VALKYRIES is to map the technological, operational and collaborative opportunities for enhancing the current capabilities of the Union first aid response teams on multi-casualty disasters (OBJ-1), reviewing their regulatory (OBJ-2), certification (OBJ-4), standardization and harmonization opportunities (OBJ-3) related identifying gaps and challenges to be addressed while proposing roadmaps for their mitigation. All the mentioned capabilities (vehicles, deployment, training, etc.) are part of the related working streams of the project (Section 1.3.1.1.2), the Consortium together with the committed end-users will select and harmonize (OBJ-6) some of them, being reference integrated (OBJ-8) with cross-domain solutions, validated, verified and presented at VALKYRIES cross-border demonstrations (OBJ-9). **Related VALKYRIES objectives: OBJ-1, OBJ-2, OBJ-3, OBJ-4, OBJ-6, OBJ-8, OBJ-9**

**Specific Call Challenge:** *"The security market in Europe is an institutional market that is highly fragmented (because of the lack of standardisation and harmonised certification), and with a strong societal dimension (it directly affects in many ways the citizens)."*

The proposal will contribute to enhancing the EU market opportunities concerning first aid response for disaster management by designing, developing and validating normalization tactics based on rational-decision making and future thinking (OBJ-5) towards allowing the Union markets to fast and agile react against the appearance of disruptive enablers. Decisions-made during the harmonization will emphasize their cross-domain impact benefits/cons (societal, political, economic, technological, etc.), adopting trustworthy AI by design (e.g., assessing the role of the explainable/interpretable AI for closing the user acceptance gaps), and prompting a pan-European circular economy by raising early awareness on the environmental cross-cutting aspects of green provisioning at normalization stage (OBJ-2, OBJ-3, OBJ-5). To maximize end-user and institutional acceptance of the solutions, security and privacy will be adopted by design. VALKYRIES will explore at harmonization stage the consequences of raising disruptive issues, like the artificial cognitive bias, or the role of the automatism at operational decision-making. The project will also deep in education and training issues, among other focalized to mitigate the impact of the global ageing of the EU citizens (e.g., embracing paradigms like active ageing), the need for further certified skills, or their preparedness. **Related VALKYRIES objectives: OBJ-2, OBJ-3, OBJ-4, OBJ-5, OBJ-6**

**Specific Call Challenge:** *"the Mandate M/487 to Establish Security Standards coordinated by the European Committee for Standardisation has clearly recognized the whole field of "crisis management and civil protection" as one of the three priorities for establishing standards in the security sector. It has identified the need for crisis management and civil protection standardisation activities to facilitate response, effectiveness, efficiency and cooperation as top priorities, especially in what regards to natural hazard emergencies)."*

Base on preliminarily EU and international effort towards closing the harmonization gaps on the disaster management sectors, VALKYRIES will map and assess the growing commercial and R&D opportunities (OBJ-1), and the opportunities (challenges, gaps) in terms of the regulation (OBJ-2), certification (OBJ-4), standardization (OBJ-3) and harmonization they entail (OBJ-5). In a preliminary exploration on state of the art (among other needed for contextualizing and defining the global vision of the VALKYRIES proposal), the EU Mandate M/487 has been an important study, where all the needs on disaster management (semantical, interoperation, technological, etc.) and their relevance for the EMS on first aid response actuations has been analysed, discussed and presented as part of the proposal target. Further related studies will be tracked and reviewed through the project development, allowing the VALKYRIES harmonization tactics to incorporate the new needs on the planned activities. As a response to the M/487 requests, VALKYRIES will pay attention to the actuation of EMS on natural hazard disasters, being present in the demonstration scenarios: e.g., Spain-Portugal (fire), Bulgaria-Greece (earthquake) (OBJ-9). Consequently, most of the enablers to be reference integrated will serve to the particularities of these disaster situations. **Related VALKYRIES objectives: OBJ-1, OBJ-2, OBJ-3, OBJ-4, OBJ-5, OBJ-8, OBJ-9**



<p><b>Specific Call Challenge:</b> <i>“Improved standards and common communication data exchange mechanisms are required for an effective deployment of resources during the run-up to a major crisis related to any kind of disaster either natural (including resulting from climate-related extremes) or man-made, and immediately after the event, for example in case of a mass evacuation from an urban area.”</i></p>
<p>VALKYRIES will map the technological, procedural, collaborative and training opportunities for common communication data exchanges (OBJ-1), being this topic present in most of the streams on the three core working blocks (OBJ-6): Technologies (Supportive Autonomous Units, Trusted new Generation Communication, Advanced end-user Terminals, Mobile Command and Control and Operational Coordination technologies, digitalisation on first aid actuations), Procedures (Maintenance, logistics and Deployment, Command and Control and support to operational decision-making, Alerting and Warning); and Collaboration and Training (Resource Federation and information sharing, Education and Training, Civil-Military Cooperation, Civil Protection and Aid Volunteering). The VALKYRIES reference integration will particularly address this challenge (OBJ-8), by harmonizing and exploring the value of distributed computing and information management capabilities, with the possibility of deploying digital resources and data exchange services on the kinetic scenario of operations (Edge, IoT, SND/VNF, etc.). This will be integrated, validate and demonstrated (OBJ-9) at real cross-border scenarios, resulting in a joint C&amp;C solutions (OBJ-7) heavily reliant on trusted data exchange and the development of a Common Operational Picture; while Compatible with existing regulations, protocols and standards (Terrestrial Trunked Radio (TETRA), Ultra High Frequency (UHF), etc.). <b>Related VALKYRIES objectives: OBJ-1, OBJ-6, OBJ-7, OBJ-8, OBJ-9</b></p>
<p><b>Specific Call Challenge:</b> <i>“Proposals should target in particular events where there are strong cross-sector, cross-border, cross-hierarchy coordination activities ongoing, and therefore the issue of interoperability.”</i></p>
<p>VALKYRIES assumes by design the cross-sector, cross-border and cross-hierarchical nature of the coordinated responses to major disaster situations. Because of this, the exploration of the related enabling capabilities will emphasize solutions that facilitate multi-domain cooperation (OBJ-1), surveying their challenges and needs in terms of regulation (OBJ-2). The VALKYRIES harmonization methodology will also assume the cross-domain implications of the normalization decision made, pointing out the related operational considerations to be taken into consideration based on their potential horizontal/vertical propagations (OBJ-5). All the project working blocks and technological, procedural and collaborative streams will focalize on these features (OBJ-6), in particular, those within the Collaboration working streams: Resource Federation and information sharing, Civil-Military Cooperation, and Civil Protection and Aid Volunteering (OBJ-7). Some of the identified opportunities will be harmonized and reference integrated (OBJ-8), being presented at the VALKYRIES demonstration scenarios. The project demonstrations will embrace strong cross-sector, cross-border, cross-hierarchy dependencies, where heterogeneous response teams, institutions and other actors must cooperate. <b>Related VALKYRIES objectives: OBJ-1, OBJ-2, OBJ-5, OBJ-6, OBJ-7, OBJ-8, OBJ-9</b></p>
<p><b>Specific Call Challenge:</b> <i>“The aim is to pave the way to improved standards, including voluntary Standard Operating Procedures (SOPs) and/or ISO or EN standards.”</i></p>
<p>The main expected impact of the VALKYRIES project is to get involved at National, European and International ongoing/planned harmonization actions. As preliminarily indicated in the highlights of the project Standardization Strategy (Section 2.2.2, full version to be delivered at D2.5), VALKYRIES partners attempt to get directly or indirectly involved in different working groups of regulatory standardization bodies/initiatives, so project's results are directly contributed to the relevant normalization activity by the involved team member (OBJ-2, OBJ-3). The contribution may range from bringing the VALKYRIES vision to the related processes, up to triggering novel pre-standardization and regulatory actions. They also will observe standardization bodies that are working on topics that are not in the core of VALKYRIES but nevertheless of relevance. The pre-standardization actions to be prompted are expected to cover standardization gaps on the surveillance landscape of first aid response opportunities (OBJ-1), but may also derive on normalizations concepting the applied methodology (i.e., VALKYRIES harmonization tactics (OBJ-5), guidelines for developing large-scale joint exercises for disaster management, evaluation methodology, etc.). <b>Related VALKYRIES objectives: OBJ-1, OBJ-2, OBJ-3, OBJ-5</b></p>
<p><b>Specific Call Challenge:</b> <i>“The centre of gravity for technology development with actions funded under this topic is expected to be up to TRL 6 to 7 – see General Annex G of the Horizon 2020 Work Programme.”</i></p>
<p>The activities of the VALKYRIES project will mostly target TRL7 thorough the project life cycle. In the shake of feasibility, the project will mainly reference integrate existing research and technological enablers (Section 1.3.1.5) coming from the previous experience of project partners. <b>Related VALKYRIES objectives: Main Objective</b></p>

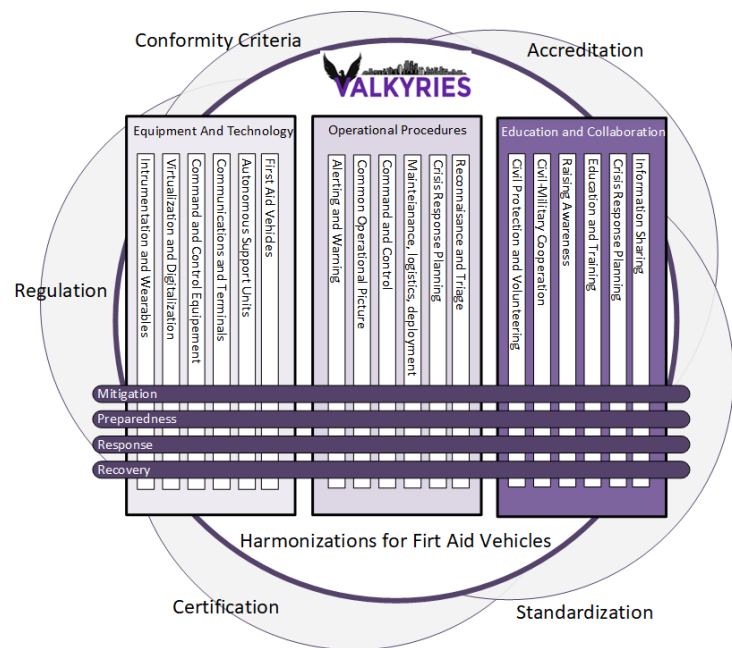
The expected impact established by the SU-DRS03-2020 call is widely described in Section 2.1.1

### 1.3. Concept and approach

#### 1.3.1. VALKYRIES concept

*According to the Norse Mythology, the Valkyries were female figures who choose those who may die in battle and those who may live (referring to their etymological meaning). Another attribution to the Valkyries was to lead*





*warriors in their battle, training healing or reanimating them after a preparedness day. In this role, the Valkyries would become intimately involved with their mortal trainees. Sometimes the Valkyries would impart deep wisdom and lore to the humans, providing protection for certain favoured warriors by either directly shielding them in battle, or warning them in-person or in a dream.*

From ancient times, natural and man-made disasters have caused an innumerable loss of lives, devastating destruction, and immeasurable economy losses; being categorized as large-scale, non-routine events that disrupt the normal functioning of a community or a society, causing widespread and overwhelming losses and impact. In addition to these threats, as the world adopted more sophisticated technologies and became further industrialized, the occurrences and impacts of technological-driven disasters increased [FAR20]. Consequently, providing security is a central concern of any society, where a **safe and secure environment constitutes a proper settlement for any prosperous community. This requires planning and taking collaborative actions to minimize the social and physical impact of the disaster, as well as reducing the community's vulnerability to the consequences of disasters through the disaster management life cycle:** mitigation, preparedness, response, recovery), towards acquiring disaster resiliency. Echoed by these needs, the European Commission (EC) has arranged the structures for developing an effective pan-European resilience against disasters and major crisis, among them the European Commission Disaster Risk Management Knowledge Centre (DRMKC), Copernicus Emergency Management Service (CEM) or the Union Civil Protection Mechanisms (UCPM) [RIZ18], which are supported by regulations like the Union cooperation framework of disaster response in case of simultaneous interventions, the EC Reporting Guidelines on Disaster Risk Management [ECR13], or legislations that requires Member States to provide information on the priority prevention and preparedness measures needed to address key risks with cross-border impacts, and, where appropriate, low probability risks with a high impact. Recent studies revealed significant regulatory and standardisation gaps that, once covered, are expected to significantly enhance the EU cooperation towards a joint resilience to disasters [ECM13]. For example, the organisational structures, semantics and processes for disaster management differ considerably within the EC and between its Member States (MS). Conforming to the Lisbon Treaty, MS are themselves responsible for disaster management on their territory. Another important issue is the fact that due to differences between MS, there is no harmonised terminology, no formal or consistent EU-wide list that defines all disaster management tasks like in the US. Finally, regarding the disaster management market, the EC aims to establish a better functioning of the Internal European Market for these security technologies.

**Figure 1: VALKYRIES global vision**

**Beyond the myth, and just as the legend of the Valkyries describes in support of the society that made them, the VALKYRIES project aims at exploring the impact of the emerging technologies, procedures and collaboration tools for supporting the actuation of the first aid responders on cross-border disasters and major crisis situations. In analogy with the Valkyries, the project outcomes will motivate and incentive cross-**

border and cross-sectoral collaboration, participating in the preparedness persons involved in the disaster management activities, supporting the orchestration of volunteering actions, bringing capabilities for enhancing the effectiveness of the EMS units while increasing their security, and once the crisis is stabilised, contributing to the recovery and post-response analytical actions. On these grounds, VALKYRIES will develop methodologies, adaptation tactics and decision criteria for their harmonisation according to the related pan-European ecosystems. To validate their effectiveness, a reference integration (SIGRUN) of disruptive enablers on legacy solutions will be conducted driven by real requirements and needs highlighted by the Consortium's end-users and practitioners, being presented at real cross-border demonstrations. Three core blocks of working streams will be developed in parallel: technologies and equipment (KARA), procedures and Operations (HERJA), and Collaboration and Training (EIR). The harmonisation, discovery of regulatory opportunities, validation and demonstration will be documented and analysed, reporting practical field notes and guidelines able to feed standardisation and regulation bodies and serving as a reference for further related integrations.

### 1.3.1.1. Conceptual VALKYRIES vision and design

The global VALKYRIES vision embraces four core actuation levels inspired in the whole observe-orient-decide-act (OODA) loop under a combined harmonisation and validation framework (see Figure 2). Initially conceived for supporting decision-making on uncertain and chaotic environments, the OODA loop traditionally adapts the scientific method for solving identifying, selecting, planning, enforcement and validating problems, in the case of VALKYRIES' OODA is going to be introduced for solving the targeted harmonisation related challenges; where Observe resembles the acquisition of preliminarily factual knowledge, Orient reasons on the best hypothetical approaches for addressing the discovered gaps and materialize opportunities, Decide selects the most suitable harmonisation vias and applies them on a reference integration, and Act coincides with deploying, evaluating and contrasting the assumed hypothesis based on the achieved analytical and empirical results. If based on the next observations, the conducted harmonisations seem inviable, unaccepted by first aid EMS practitioners, significantly impacted on cross-domains (procedural, cooperation, training, etc.) without the possibility of being adapted, or returned a pessimist benefit/cost balance, the decision loops are executed again looking for a better solution but bearing in mind the lessons learned; the latter serving as practical recommendations for the harmonisations. The VALKYRIES Consortium hypothesises the OODA potential under the following core statements:

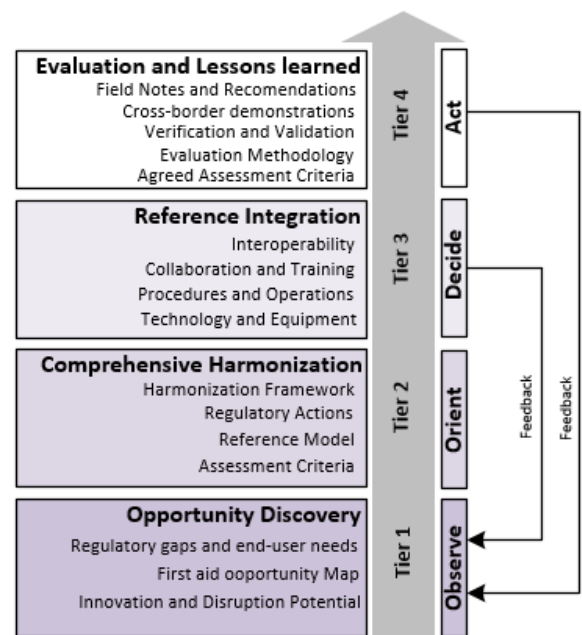


Figure 2: VALKYRIES actuation levels

- 1) **Fast and efficient reaction against disruptions and non-EU pre-standardisation actions.** the OODA loop has been adopted by a business to assist in speedy decision making so that as soon as an external problem is on the horizon, a solution can be found before market competitiveness is degraded [VET19]. This is significant, bearing in mind the growing ICT and collaborative ecosystem, where disruptive opportunities may suddenly appear, which the pan-European first aid EMS shall be able to incorporate as soon as possible. This also enhances the EU competitiveness in normalizations.
- 2) **Harmonisation supported by Divergent and Future Thinking mechanism.** Convergence-Divergence and other Future Thinking enablers can be integrated into the Decide phase of the OODA loop. Here, hypotheses are generated, and comprehensively selections shall be made to guide the harmonisation actions [SMI18]. The overlapping divergent and convergent mechanisms may have an impact in helping decision-makers to envision possible solutions better, generate future-oriented alternatives converging on the 'best' opportunity decision-makers will have, and make more decisions in scenarios characterised by extreme uncertainty.
- 3) **Flexibility, usability and most effective stakeholder engagement.** The OODA loop is an extremely usable paradigm that typically operates in all phases simultaneously under a preliminary partitioned main problem into different sub-challenges. On the other hand, different harmonisation processes on the OODA basis may converge into a joint OODA-loop related process, which became useful when merging regulatory and standardisation efforts initially conducted by different local, European or International normalisation agents. These properties

facilitate the engagement of experts, institutions or working groups, allowing to initiate further OODA iterations while committing new points of view [GOO20].

- 4) **Speed-up and agile rational-comprehensive decision-making.** Regulation in solutions suitable for major crisis management implies to consider a wide vertical/horizontal thinking for rational-comprehensive decision-making. In this way, it is expected that all possible harmonisation options are identified, including their benefit/cost and potentially propagated implications. The main problem when enforcing rational-comprehensive approaches is that they are often very costly in terms of time and other resources that must be devoted to gathering the relevant information, which entails a major drawback when attempting to respond to disruptive opportunities efficiently [COC20]. Thus, an OODA-based harmonisation approach brings the flexibility required for covering the broad decision-making spectrum.
- 5) **Deployable and applicable at capability thorough development life cycle.** The OODA inspired harmonisation method to be developed by VALKYRIES complements the thorough EMS solution design, development, integration and validation up to normalisation and acceptance. Beyond its application for surveying and exploiting the EU related opportunities, the proposal will serve as guidance to by-design construct novel solutions and/or make them fit in the European and International markets in compliance with the pertinent regulations and end-user expectations. As an illustrative application, the VALKYRIES' reference integration will embrace this process, returning recommendations, field notes and guidelines for being considered at future developments.

#### 1.3.1.1.1. Comprehensively Harmonisation and analysis of related decisions made

VALKYRIES will explore novel harmonisation procedures focused on emphasising the cross-sectorial, cross-hierarchical, cross-board, legal, ethical and political implications of decisions made, where a primary action of the OODA's Orient phase will address the development of a reference model for rationale harmonisation of first aid EMS technologies, procedures and collaboration opportunities (task T2.5). This reference model will be instantiated as a novel harmonisation framework where rational-comprehensive decision-making, divergent and future thinking will support the anticipation and reaction against the uncertainty inherent in the broad ecosystem of emerging opportunities. In consistency with the relevant ethical-legal framework, the process will at least cover the following actions: 1) selection and deployment of a federated data-sharing platform that brings access to national/regional databases of relate data (datasets, legislation, technical specifications, etc.); 2) surveillance of related information and definition of a harmonised lexicon, vocabularies, glossaries, etc.; 3) multi-factor categorisation of the collected information bearing in mind (source, topic, publication date, etc.); 4) agreement of a minimum set of common requirements (*Convergences*); 5) harmonisation definitions on minimum set of requirements; 6) identification of key characteristics to support regulatory adjustments (*Divergences*); 7) identify and assess the cross-domain propagated impacts associated to the discovered divergences; 8) rate divergences and rationale decision-making; and 9) produce the harmonisation and rationale, clearly indicating the solutions considered, their benefices/drawbacks, the operational consequences of the excluded divergences, etc. All of this supported by lean learning enablers for supporting the acquisition of collective knowledge.

**Rational decisions.** Figure 3 depicts the highlight of the VALKYRIES rationale decision-making approach to defining at WP2 (Design Principles and harmonisation Tactics), where a first reasoning stage will aim at constituting a rational problem statement, followed by a convergence reasoning phases aiming to identify and agree with the minimal common requirements, to explore the different options for harmonising the

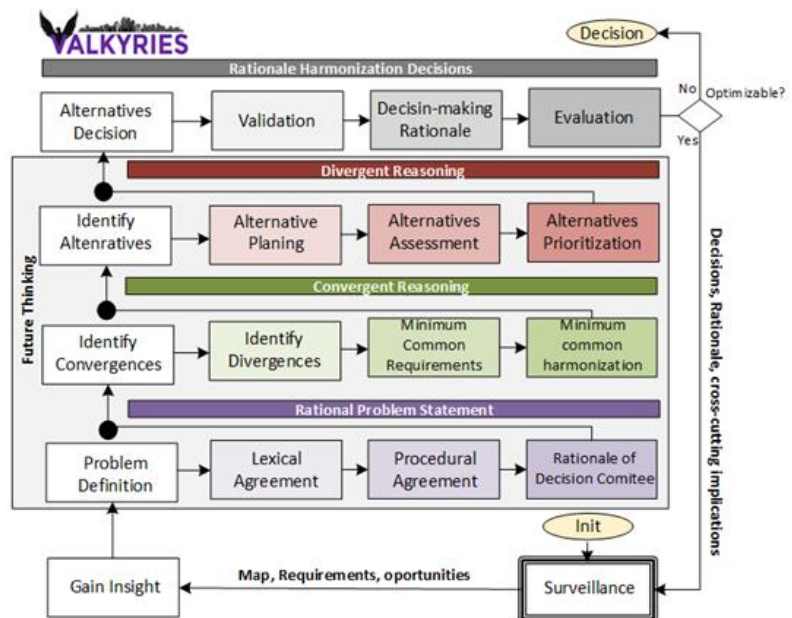


Figure 3: VALKYRIES rationale decision-making

divergences, and based on them decide the most suitable solutions. The process will cover all rational of all the hybrid aspects (PMESII [WIT16]). Each harmonisation decision will be rationalized as a Course of Action (CoA), hence being an element to be considered at operational decision-making and that must be present at C&C level (tactical, strategical, etc.). Beyond the conventional harmonisation reports, the decision Rational will point out the decisive conditions (aspects) appropriate for success, related planning concepts (inputs, dependences), short-mid-large term projection, benefits/drawbacks and any contextual issue to be assumed when first aid EMS rely on linked solutions.

**Decision impact propagations.** Beyond state of the art, VALKYRIES is going to deepen into the horizontal and vertical propagation of the analysed divergences, which shall carefully study based on the potential cross-border, cross-sector and cross-hierarchical aspects of the operations in which the target harmonisation solutions are expected to be displayed. To contribute to prevent and manage similar situations, **the VALKYRIES project will assume by design to consider and include as part of the harmonisation decision Rationales the foreseen propagated impacts (vertical/horizontal) between domain (technologies, services, operation, preparedness, collaboration, etc.), which beyond serving for facilitating the understanding of the harmonisation process and the decisions made, maybe be dynamically taken into consideration at operational decision-making, thus allowing decision-makers to select and plan possible countermeasures.**

### 1.3.1.1.2. VALKYRIES Core Building Blocks

#### 1.3.1.1.2.1. KARA: Technologies and Equipment for first aid responders

During the VALKYRIES project, the following innovation streams will be studied, analysed and a subset of their identified opportunities will be selected, harmonised, integrated and demonstrated on the reference integrations.

Stream	Scope
<b>Vehicles and Transport Infrastructure</b>	Vehicular and on-foot units' mobility on first aid EMS actuations is the central element on which the sanitary effectors are deployed on the operational environment to conduct rescue and emergency care missions; if required, then transferring the victims to surrounding Mobile Emergency Medical Centres (MEMC) or related facilities. VALKYRIES will explore the different trends on first aid EMS vehicles and infrastructure, among others by covering the following topics: cross-domain mobility (sea, land, air), Connected and Autonomous Vehicle (CAV), Cooperative Intelligent Transport Systems (C-ITS), hybrid/electric vehicles (HEV) and other autonomy improvements, novel signalling concepts (lights, sirens...), AI and noise/vibrations cancelation, supportive robotics, 3D printers, safety and security, etc.
<b>Supportive Autonomous Units</b>	Due to the uncertainty of the disaster situations, first aid responders may operate under conditions characterized by the collapse of health facilities, the disruption of health systems, destroyed roads and debris-covered areas which, among others, hinder medical teams in reaching remote locations. The rapid increase of the applicability of unmanned units on disaster and other BLOS context results in a promising alternative of transport (medical supply, organic samples, etc.), surveillance (field examination, victim recognition, notification of ongoing aftershock threats and hazards, etc.) and deployment of ad hoc ancillary infrastructures (antenna, remote control, etc.). VALKYRIES will explore different trends and applicability of multi-domain unmanned units (Unmanned Aerial Vehicle, Unmanned Ground Vehicle, Unmanned Surface Vehicle, etc.) on first aid EMS actuations on disaster scenarios.
<b>Trusted new Generation Communication</b>	Legacy public safety and mission-critical communication systems (e.g., ETSI's TETRA) have been designed primarily as purpose-built mobile radio networks for the delivery of mission-critical voice, as well as a select number of narrowband data services (e.g., text-based messaging). They have been costly to design, deploy and maintain. Still, without a fundamental redesign, they will not be able to deliver and exploit media-rich type services currently accessible over public networks already delivered by growing paradigms such as Multi-access Edge Computing (MEC) or 5G. This stream will focus on exploring and harmonising the recent advances in trust connectivity for supporting first aid EMS actuation, such as MEC, 5G, Cognitive Networking and Large-Scale NGSO Satellite communications, among others.
<b>Advanced end-user Terminals</b>	The end-user mobile technologies are characterized by bringing access to broadband communications via versatile devices that are rich in features and functionality, easy to learn and quick to deploy, which resulted in multiple applications. In the context of first aid EMS responses on disaster scenarios, they may include routing maps and point out roadblocks and other



	obstacles to be considered. They facilitate information sharing (building maps, lists of on-site hazardous materials, emergency plans, etc.); help to coordinate patient transfers to hospital; access patient records while in route and consult with emergency physicians on complex treatments (e.g., telehealth, taking photos/videos of patient's injuries and securely transmit them); VALKYRIES will explore and support the harmonisation of the opportunities bring by end-user mobile devices (tablet computers, smartphones, personal navigation devices etc.).
<b>Mobile Command and Control and Operational Coordination technologies</b>	The wide pan-European on ICT depicts a promising context for exploiting C3ISR opportunities that enhance the personnel adaptability, operational decision-making and course of action planning (Big Data analytics, advanced simulation environments, etc.), real-time collaboration and information sharing (distributed computing, decentralized databases, etc.) or mission-centric risk management. VALKYRIES will analysis in-depth these operational and harmonisation opportunities, serving as core for the SIGRUN platform.
<b>The digitalisation on first aid actuations</b>	The digitalisation of the operational environment allows the first aid EMS to aggregate, replicate and represent the physical, virtual and socio-cognitive related assets, and their dependencies and procedures; on which advanced analytical (if-then simulations, prediction, pattern recognition, synthetic generated data), collaborative (simulation and digital twin federation, connectivity with smart infrastructures: smart cities, smart ports, smart airports) and preparedness (human-in-the-loop analytics, simulation and digital training against table top exercises, etc.) may be conducted. VALKYRIES will explore and work towards harmonising the growing opportunities on first aid related to trending topics like model aggregation and simulations, modelling and static digitalisation towards allowing them to interact with related IT/OT services, Digital Twins and/or portable Experimental Digital Twins (EDT) for enabling in situ analytics, etc. The stream will emphasize the human aspects on digitalizing the sector, exploring solutions like trustworthy, explainable/interpretable AI to close the gap between the person and automatisms.
<b>Instrumentation and health support wearable devices</b>	VALKYRIES will explore and contribute to harmonise opportunities for first aid responders at disaster situations derived from the combination of consolidated sensing and instrumentation capabilities (global positioning, radio-acoustic sounding system, motion signals, etc.) and the adoption of recent advances in related trending technological areas, like remote sensing techniques enabled by multiple remote sources (UAV, satellite, etc.) for contributing to map the operational environment and enhancing the effectiveness of the response logistics; Geo Spatial Systems (GIS) (spatial planning, infrastructure and deployed unit location, logistic planning, search and rescue, etc.); IoT wearables for real-time monitoring (thermometer, electrocardiogram, electroencephalogram, blood pressure, etc.) and analysing patients (vital signs, anomaly detection, early diagnosis...) while supporting response teams operation.

#### 1.3.1.1.2.2. HERJA: Procedures and Operation for first aid responders

VALKYRIES will promote the development and improvement of infrastructures, protocols and data exchange standards, effective in the deployment, intervention and local and remote coordination of the health response in incidents with multiple victims and disasters. This will be done with a special application where interoperability is required as it affects several regions/countries. VALKYRIES will address the following related working streams:

Stream	Scope
<b>Reconnaissance and triage</b>	To contribute to the assessments of the situation, tasks of health first aid teams must address two key priorities: 1) support rescue personnel, recognize the affected area, locate and remove the affected or threatened people from risk in the area and guarantee basic medical support measures; and 2) organize and implement initial medical care on-site for all victims, as well as their evacuation to hospital centres for their definitive treatment when appropriate. Prioritization is required to assist victim groups in the most effective way, which can be based on criteria of severity, probability of survival, and availability of resources in the field ( <i>triage</i> ). Bearing this in mind, VALKYRIES will identify the key aspects and opportunities in the different phases of the healthcare response to an incident with multiple victims on disasters, adapting them to the suggested harmonisations. It will determine the basic set of data that, derived from these processes, must guarantee harmonization, facilitate communication, interoperability and effectiveness.
<b>Crisis response planning</b>	In the management of a catastrophe, it is necessary to have the key information to anticipate risks, as well as that the emergency response is pre-planned. The risks of a given territory are evaluated based on the analysis of danger and vulnerability. The results obtained are reflected in maps that

	collect the different georeferenced layers with information related to the risks considered. VALKYRIES will analyse the opportunities and normalization gaps towards support crisis response planning. Particular emphasis will be put on facilitating the development of risk maps. In this sense, it will not only be able to find out if there are vulnerable elements in the risk area but also locate infrastructures that may be useful for actions such as health care or sheltering the evacuated population. These plans include a catalog of mobilised means and resources that can be used under the terms previously established. VALKYRIES will facilitate access to the existing response plans, as well as the media and available catalogs, for decision-making.
<b>Maintenance, logistics and Deployment</b>	The mobilization, storage and deployment on the ground and the maintenance of all the necessary elements to help the people affected by the disaster, or to support emergency response staff themselves, require a logistics organization that allows efficient management and optimal use of the resources. Logistics cannot be improvised but must be integrated into crisis response plans as well as the particular action plans of the organizations involved in disasters, in connection with the rest of the operational aspects of the response. VALKYRIES will identify the fundamental aspects in the maintenance and logistics of first aid response to a mass casualty incident or a disaster, adapting them to the suggested harmonisations. It will determine the basic set of data that, derived from these processes, must be guaranteed on the platform to harmonize the information and facilitate communication, interoperability and effectiveness when responding. It will also issue proposals that make it possible to evaluate and select the related opportunities.
<b>Command and Control and support to operational decision-making</b>	Commands of services involved in disaster situation must have up-to-date information on vital aspects for decision-making. This includes weather forecast, terrain orography, accessibility of the area, risk stratification, nearby vulnerable elements, available infrastructures to use, health facilities, location of available mobile resources, etc., which shall pre trustworthy shared by all the health services that act. VALKYRIES will explore existing gaps and emerging enablers towards defining an information network that allows emergency commanders to maintain situational awareness and obtain relevant information for decision-making. This information will be both in the health field and in the search and rescue area, but also in the field of security since all these aspects are involved in the comprehensive response to the emergency. This information network will facilitate the coordination of joint operations, which will allow a more rigorous, uniform, rapid, safe and efficient response to be given to all those engaged in the emergency response, above the multiplicity and diversity of the intervening services.
<b>Common Operational Picture</b>	When responding to catastrophes, services from different fields are involved (health, search and rescue, security, logistical support, volunteering, etc.), which must act in a coordinated way. Each of these services develops given actions but, in many cases, they must work together to benefit patients. They also depend on procedures and protocols that establish how to act. But joint action procedures are necessary to confirm what the priorities are at all times and what support some actors need from others to facilitate those specific priority actions. To this end, VALKYRIES will work on the creation of a federated database structured in layers or categories of information. They will refer to incidents (location, deployment...), victims and health care (affiliation, status in the care chain...), resources and intervening parties (personnel in place, control of staff changes...), risks and civil protection (operating instructions...) and also security (checkpoints...). This database will allow a common operational picture with all the relevant information that facilitates collaborative planning and the coordinated execution of the response by all the levels involved.
<b>Alerting and Warning</b>	It is essential to be able to issue alerts and warnings in disaster situations, both to the personnel involved and to the population in general. In the case of the former, it is needed to have operational communications that allow the command to contact all those involved; for example, in case of threat that forces to evacuate the place. In the case of the population, it may be deemed to send messages so that the population leaves the area, confines or adopts specific protection measures. VALKYRIES will work on the development of a communications network between the involved responders through the exchange of data, messages and/or voice, possibly recording all communications regardless of their origin, location or language. Likewise, it will allow having the necessary information for the elaboration of the messages that must be broadcast to the population through the media, social networks or channels that the command finds most convenient.

### 1.3.1.1.2.3. EIR: Collaboration and Training for first aid responders

An effective response to cross-border disaster response requires strong cross-sectorial, cross-border, cross-hierarchy coordination activities, and therefore, the issue of interoperability in technology, organisation, human behaviour, tactics and procedures, information exchange, etc., is a crucial requirement. VALKYRIES will review the opportunities on these topics through the following workstreams.

Stream	Scope
<b>Resource Federation and information sharing</b>	The digitalization of the sector brings emerging federation and information capabilities able to faster the collaboration and preparedness of the first aid responders where paradigms like Cloud Computing, Big Data, Network Function Virtualization, etc. offer promising solutions deployable at the operational edge. This workstream will be analysed them producing a map of related opportunities while pointing out their regulatory and normalization gaps. Beyond their supporting technologies, VALKYRIES will also deep into the data representation, semantics, permissions, etc. to be taken into consideration for facilitating cross-sectorial resource federation (responders, institutions, public, etc.), which may range from operational capabilities (services, infrastructure, etc.) up to strategical assets (institutions, joint planning, etc.)
<b>Education and Training</b>	The digitalization of the sector brings strong and disruptive capabilities (leash learning, learning analytics, hyper-realistic simulations human-in-the-loop simulations, etc.) for enhancing the preparedness in terms of education and training of the EMS, and the cross-sectorial (even general public) actors that may contribute to mitigate major disaster situations. This workstream will review them looking for opportunities and needs concerning regulations and normalization. As a support to the reference integration (SIGRUN) and the project demonstrators, VALKYRIES will develop advanced education and training kit, including curricula, training materials and education methodology for first aid responders. This kit will be tested against multinational, cross-sectorial and cross-hypercritical audience to support the process of interoperability building for first aid responses in case of cross-border and cross-hierarchical disaster situations.
<b>Raising practitioner and social awareness</b>	The role of first aid practitioners and social awareness in the case of cross-border and cross-hierarchical disaster situations is critical for success. The digitalization of the society brings a plethora of opportunities able to enhance the conventional strategies for raising awareness (media, social networks, video streaming services, etc.), which potentially be reviewed during this working stream; also highlighting their related regulatory/normalization gaps. In the context of the reference integrations (SIGRUN), VALKYRIES will focus on identifying the types of information to exchange among different first aid responders; towards achieving effective coordination in a cross-border, cross-sector, multi-hierarchy, public and private context for situation assessment, response decisions and communication policy to the public. Special attention will be given to effective and timely information of the population in the areas of disaster, as well as planning and developing information campaigns able to attract volunteering and prompting safe practices.
<b>Civil-Military Cooperation</b>	The VALKYRIES Consortium is going to emphasise the role of CIMIC, particularly in the case of large-scale cross-border disasters that will mass casualties as a key factor for successful crisis management. The Consortium will explore lessons learned from previous operations, by identifying main interoperability gaps among different agencies engaged in managing crises and will suggest improvements in doctrinal and procedural, as well as operational and tactical documents and instruments for collaboration. During the development of this workstream, BDI (as military institution) will act as the voice of the military needs while attracting the commitment of military stakeholders.
<b>Civil Protection and Aid Volunteerism</b>	Collaborations of civic society and public administration play a key role in successful emergency and disaster management. In many instances, the tradition of organised volunteering in support of organised disaster management processes is a long one. However, new technologies, large scale disaster events, and a differently engaged population are some factors combining to bring new, spontaneous or emergent forms of volunteerism to official disaster management activities (crowdfunding, social influencer, development of online training material, etc.); which can complement the traditional ones. This workstream will analyse the opportunities and regulatory gaps in new ways of volunteerism; in the same way that will review the emerging solutions for cooperation with Civil Protection agencies and other related institutions. In the context of the reference integration (SIGRUN), particular emphasis will be put in facilitate the first aid responders with these actors, and facilitate their fast formation (education and training).

#### 1.3.1.1.3. SIGRUN: Reference Integration

The main aim of the reference integration is to provide a real use case driven implementation that allow applying the proposed normalizations on some of the discovered technological (KARA), procedural (HERJA) and collaborative and training (EIR) opportunities. The decision of the opportunities to address will consider the priorities pointed out by end-users and practitioners of the VALKYRIES Consortium, resulting clearly as defined at the end of task T2.1. Settled in the principles indicated in Section **¡Error! No se encuentra el origen de la referencia.**, the reference integration embraces:

- 1) **Local adaptation of a set of technological, procedural or collaboration opportunities** to separately fit a set of end-user's needs (harmonization opportunities) prioritized at the early stages of the project.
- 2) **Interoperability (physical, logical, semantical, etc.) of the locally normalized solutions** with each other's, the existing capabilities daily applied by the EU EMS, legacy solutions and/or other disruptive enablers for serving the end-users' needs while proving enhancements over the existing solutions.
- 3) **Continuous validation and verification of their sustainability and interoperation.** Then present to the community that beyond fitting the normalization gaps, the reference integration provides added value for the end-user at the four VALKYRIES cross-border demonstrations.
- 4) **To document, discuss and analysed the complete reference integration life cycle**, so further related actions (normalization groups, integrations, product developments, etc.) may leverage the lessons learned.

#### **SIGRUN: Cognitive communications and resource federation for C&C at first aid responses in MCI.**

The combination and interconnection of the harmonized solutions will constitute the SIGRUN platform, providing advanced communications, information sharing and tactical C&C services for the first-aid responders. The following summarized the primary interests of the participant end-users, which settles a baseline for building the harmonisations. The following describes its key elements, which will be expanded by the needs and opportunities discovered and prioritized during the development of the VALKYRIES task T2.1.

##### **Technical scope of SIGRUN**

- Distributed computing and information management capabilities, with the possibility of deploying digital resources in the kinetic scenario of operations (Edge, IoT, etc.), as well as at the level of centralized coordination infrastructure (e.g., C&C).
- Compatible with existing regulations, protocols and standards (Terrestrial Trunked Radio (TETRA), Ultra High Frequency (UHF), etc.), exploring their gaps and integrating/demonstrating improvements under the umbrella of the latest enablers.
- Context-aware, allowing recalibrations according to the acquired situational awareness (OODA for service deployment).
- Adoption of self-organizing network paradigms (e.g., SDN, NFV, SON, 5G), thus allowing to prioritize services/capacities as required by the mission (e.g., security vs. latency, QoS vs. connectivity, etc.) while deploying new services at the edge.
- Point-to-point distributed and intelligent trust throughout the entire information management cycle.
- Protection of communications to cyber-physical threats (e.g., EM, jamming, cyberattacks, etc.) and misuse (configuration errors, data leakage, etc.). Protection against the vertical/horizontal propagation of cyber-physical threats to the operations plane, facilitating the acquisition of situational cyber-awareness and inference of probability and impact.
- Exchange of information and services between security platforms and domains, facilitating cooperation on participants, and improving cooperation between national and European devices.
- Telecare, wearable devices, triage, patient information, mHealth.

##### **Functional scope of SIGRUN**

- Support the acquisition of situational awareness and multi-level (technical, tactical, operational, etc.) decision making.
- Support the deployment of high latency centralized/decentralized ad hoc communication on BLOS scenarios (even when the fixed communication infrastructure has been damaged).
- AI-assisted coordination of joint operations to provide a more rigorous, uniform, rapid, safe and effective response from all resources regarding the multiplicity and diversity of actors inherent in cross-border actuations on disasters.
- Improvements in the continuity of care (from the disaster site to local hospitals and/or Emergency Medical Centres) based on the most suitable real-time communication and information exchange.
- Improvements on the identification, monitoring and traceability of victims.
- Facilitate the post-disaster analysis, acquisition of lessons learned and from them supporting the recovery actions.
- Simpler and more effective education/training for first aid intervention on incidents with multiple victims. This shall cover from table-top exercises to advanced simulation capabilities; up to facilitate large cross-border exercises.



### SIGRUN application as tactical command and control services for first aid responses

On these grounds, the capabilities for Command and Control (C&C) to be reference integrated comprise three subsystems:

- Subsystem **Data Centralization**: central database, to which all the devices of the first responder teams with the capacity to record and centralize data will be securely connected. These devices would be: 1) victim identification bracelets, 2) responders' wearable devices, 3) mobile application for health responders in MCI, 4) portable command and control devices, 5) Mobile Unit for Operational Coordination, and 6) Command and Control Application. Likewise, the Data Centralization Subsystem will allow obtaining peripheral data from 1) integration of data recorded by other devices (e.g., vehicles, intervention equipment, meteorological sensors, specific risk sensors and detectors, etc.); 2) Information obtained through channels external to the System; and 3) Information obtained from the support tools of the System, among them advanced analytics based on explainable AI and human-in-the-loop simulation.

The devices will send information to the Data Centralization Subsystem. This information, in general terms, will have a series of cross-sectional data and a minimum set of specific pre-set data. The cross-sectional data will be basically: 1) Identification/Device; 2) Geographical location (registered/referenced); 3) Timestamp; and 4) Characterization or content of the information. It will be possible to have several instances of the Data Centralization Subsystem, deployed at the edge (e.g., VNFs) to manage the information separately for different services.

- Subsystem of **Command and Control Application** connects with the Data Centralization Subsystem, presenting its information processed in geographic, tabulated or report support. It is possible to select different layers of information to give and compare for decision making. It also allows the introduction into the Data Centralization Subsystem of certain operational information, which would be command and control decisions. Among other options, the application allows: 1) defining geographic spaces, which group information from data sources geo-localised within those spaces. This allows to establish, unify or separate different incidents, which can be modified with the evolution of events; 2) adding specific operational instructions (deployment, evacuation, etc.); 3) recording notes and events in the incident file; 4) managing the users of the Command and Control Application itself; and 5) managing the linking and access of the different devices of the scalable modular platform to the Data Centralization Subsystem.

The Command and Control Application will collect and interpret from the Data Centralization Subsystem the following layers or categories of information, among others: 1) **Incidents**: location, characterization, zoning, deployment, history, etc.; 2) **Victims and healthcare**: location, identification data, current status within the healthcare chain, clinical condition in real-time, priority (triage categorization), evolution, healthcare deployment, operational instructions; 3) **Units and staff**: Units in the place, units in transit, units at rest, control of staffing relays, deployment, communication, automatic alerts; 4) **Risk management and Civil Protection**: zones and characterization, operational instructions, meteorology, meeting points, evacuation routes, warning and identification of threats and vulnerabilities, emergency plans, resource maps, self-protection plans, evolution, forecasting scenarios, etc.; and 5) **Security**: areas, location of resources and security elements, resource concentration points, evacuation routes, control points, operational instructions, etc.

Besides, the following information will be presented: 1) **Geo-positioned on cartography** (by signs that facilitate interpretation and/or complete or selected through filters; 2) Structured in operational **user screens** and dynamic dashboards configurable in real-time. This allows adapting them to the particularities of each incident, or each service involved, and to the specific needs of each moment. These screens and dashboards are aimed at Global Command and Control, Assistance to victims, Risk control and Civil Protection, and Security; and 3) **Through reports**: it allows generating status reports and configurable final reports for documentation or communication.

- Subsystem **Application for Communication, Messaging and Voice**: multilingual that manages the communications between the participants, by means of messages and/or by voice, through the different devices integrated into the platform. All communications from any source, location or language are recorded. This application will be contained or at least must be governed from the Command and Control Application.

### SIGRUN Mobile Application for Sanitary Interventions in mass casualty incidents

The **Mobile Application for Sanitary Interventions in Mass Casualty Incidents** shall be a Multilanguage application for smartphones or tablet devices, used in real-time by the first medical responders in mass casualty incidents. The application will have offline operability, shall synchronize information with nearby devices in the field in case of availability of Bluetooth/Wi-Fi/4G/5G, and shall integrate into the Command and Control Application in case of Wi-Fi/4G/5G network availability, centralizing the information to the Data Centralization Subsystem of the Command and Control System. These communications will be integrated into the Communication, Messaging and Voice Application Subsystem in case of having Wi-Fi/4G/5G network availability. The application can also be used in simulation mode, integrated or not with the Command and Control Application, for online training or training in simulation drills. Four basic initial options are foreseen:

- **Incident Reporting** allows declaring and/or characterizing a mass casualty incident, through a user screen that allows: 1) seeing the cartography of the area and the positioning of the event (configurable); 2) describing the magnitude and nature of the incident; 3) communicating estimate number of victims; 4) alerting of suspected CBRN accident or terrorist action; 5) recording observations (all additional information that you wish to detail); and 6) incorporating photographs and images. In an online connection, all the information is centralized in the Command and Control Application in real-time.
- **Victims Management** supports the emergency medical responder in caring for victims in the field, allowing at the same time the registration and centralization of medical information. It is possible to register a victim or update the information related to an already registered victim. It allows the reading of a barcode or QR code to facilitate the identification or access to the information of an individual victim. A "List of Victims" screen shows the list of patients with the key information for each one of them: identification, characterization, priority, status in the care chain, etc. Selecting a victim in the list accesses all his/her information. The order of patients in this list is established by predefined patterns related to severity and evolution time, to facilitate healthcare decision-making. With online connectivity, the information of the victims is centralized in the Command and Control Application in real-time.
- **Ambulance Management** supports the emergency medical responder in managing ambulances and emergency medical staff in the field, allowing at the same time the registration and centralization of information related to them. It shall be possible to register a unit or update the information related to an already registered unit. A "List of Ambulances" screen will show the list of ambulances with the key information for each one of them: identification, characterization, priority, operational status, etc. The order of elements in this list will be established by predefined patterns related to availability, to facilitate logistic decision-making. With online connectivity, the information of the ambulances is centralized in the Command and Control Application in real-time, being the historical saved.
- **Operating Support** allows access to operating recommendations for command over the field. These recommendations are established based on the number and estimated severity of the victims. Basically, support is given as to what priorities to attend to at each moment and what resources would be advisable to use to cover each need. Since the number and severity of victims can change, it can be updated at any time, and then the corresponding operational recommendations will also be automatically updated. Recommendations can be marked as passed as they are completed. In this way, it is easy to see which tasks have been carried out and which tasks are pending.

### 1.3.1.2. Use cases for demonstration

#### Use Cases common points to achieve

**Cross-cutting aspects.** Managing an incident with multiple victims requires the intervention of multidisciplinary teams with complementary functions such as security, rescue, healthcare, etc. Each team collects and generates valuable information that affects the entire operation for the development of its duties and for the other teams too. A standardized, complementary and scalable collection of information by the first participants will generate a synergistic effect providing truthful and real-time data to all those involved, facilitating and improving the work of each one separately. Cross-hierarchy aspects are also addressed since first responders (FR) from different administrative levels (e.g., local, regional, national and transnational) need to smoothly and efficiently cooperate as emergency response teams to tackle the disaster.

**Contributions of VALKYRIES.** VALKYRIES allows generating synergies between first responders that will improve their activities, standardizing the collection of information in the form of a Minimum Data Set (CMD) for each stage of intervention, and generating truthful and real-time information for decision-making in the Command and Control posts. VALKYRIES simultaneously feeds on all the data generated by all the first responders who feed the system providing reliable information according to the standardized records for each user profile and intervention stage, the so-called CMD. At the same time, it feeds back all the participants and their respective commands, according to their user profile, of the information generated synergistically among all by reducing waiting times and accelerating the intervention, thus increasing the efficiency of the system. For emergency response to each type of disaster, specific Standard Operative Procedures (SOPs) need to be followed. Thus, for emergency response to a combined disaster, organization interoperability, communication interoperability and command and control interoperability issues (between FRs charged with different tasks) will be to a certain extent addressed. At the same time, organizational interoperability and communication interoperability is inevitably addressed.

**Value, End-User Benefit.** VALKYRIES enables standardized, decentralized and layered registration of information. Big-data coming from different end-user profiles are generated, who enter the information following standards and support this way to the rest of end-users. Furthermore, VALKYRIES assures the safety of the data in real-time while ensuring the traceability of each data/process. One of the most novel aspects of VALKYRIES is the possibility of message/voice/image communication thanks to 5G technology. It allows eliminating communication

delays between different levels of the operations, minimizing at the same time the need for synchronous verbal communication. Recorded data might come from different sources: *active* (i.e., coming from the first responders) and *passive* records (i.e., coming from official sources like weather information, geolocation of resources and victims, images by drones, etc.). VALKYRIES will also address the development of joint cross-border risk management plans and ensure a risk mitigation toolbox and measures, draft a list of control indicators to be followed and monitored on a cross-border level regularly.

**Potential involved Technological enablers.** VALKYRIES integrates, thanks to the latest technology and 5G technologies, basic information from each stage of intervention/management with the geolocation of each registered case. This integration enables efficient management of both the injured citizens and first responders on site. Each victim's geolocation wristbands can store and send secure and traceable health data. The sensors of the intervention teams, together with the images provided by the drones, will map the status of the situation in real-time, thus supporting informed decision making. On the other hand, big-data derived from real or simulated cases will allow the technological development of multi-victim incident simulation platforms for standardization, training and teams' certification throughout Europe.

**Potential involved Operational enablers.** VALKYRIES allows advancing on a common big data standard in the EU. The synergies created among first responders regardless of their country of origin, language or legislative rules will be integrated in VALKYRIES. Each participant will continue to apply its local, regional or state level protocols in line with its legislation, nourishing with the information collected in VALKYRIES. Besides, VALKYRIES allows joint coordination of the incident by assisting in fundamental aspects such as the availability of resources, number of victims, operational situation of each region and the overall incident. VALKYRIES will suggest an innovative approach in observe-orient-decide-act (OODA) loop, using AI to support a decision-making procedure. VALKYRIES will also focus on the enhancement of Civil-Military Cooperation to guarantee situational awareness, medical evacuation, support in case of CBRN agents, transportation, civilian protection, etc.

**Potential involved Education and Training enablers.** Education for municipalities and general public and economic entities, training on the development of risk management plans and auditing potential threats, delivery of awareness video materials and public campaigns, workshops for economic entities and involve them in the pilot action.

#### UC#1: Join cross-frontier first aid response against major fire disaster

**Overview.** The 112-emergency coordinator centre (CCU) in Badajoz, Spain, receives multiple calls alerting for fires in areas near the border between Spain and Portugal. Assume that the incident begins in Spain and progresses rapidly towards Portugal, affecting the Natural Park of Serra de S. Mamede, endangering several border towns. News on the incident suggests that it is an intentional fire that threatens several urbanized areas in the middle of the mountain and with an extensive wooded area. Alert is activated related to several deceased citizens and cars trapped by the advance of flames, events similar to the ones that happened in 2017 on "the road of death" that links the Portuguese municipalities of Figueiró dos Vinhos and Castanheira de Pera, in the district of Leiria. The intensity of the fire, together with the large extension of the burned ground and the weather situation, requests the authorities to activate the regional emergency plan, requesting the intervention of the military emergency unit. Under these circumstances, coordination between different stakeholders is crucial to minimize human and material damages. VALKYRIES will support a systematic and homogeneous gathering of relevant information suitable to improve every stage of the intervention by providing vital information for the first responders' teams for informed decision-making.

**Location.** Five different fire locations endanger the Natural Park of Serra de Sao Mamede (protected area of 50,000 hectares declared a natural and landscape heritage). The fire affects several towns, such as La Aceña de la Borrega and Las Huertas de Cansa. Incident management is considered complex, also considering the long distance to the nearest fire station and hospital, located in Portalegre city, 24 km and about 30 minutes away.

**Participants and Roles.** Participants in the demonstrator will divide into 4 multidisciplinary teams:

- a) Multidisciplinary Team 1 (Planning): EXPERTs from SERMAS lead, with the support of other partners and local authorities, the planning of the exercise in the described area. This team will coordinate the rest of the teams.
- b) Multidisciplinary team 2 (Execution): The Spanish and Portuguese emergency coordination centres in the area will launch, with the support of multidisciplinary team 1, the demonstrator. Police, firefighters, civil protection, red cross and medical emergency department, among others, will participate.
- c) Multidisciplinary team 3 (Coordination/Command-Control): Crisis management multidisciplinary team 1 will deploy the decisions taken at the command control, using the VALKYRIES system.
- d) Multidisciplinary Team 4 (Analysis/Feedback): All the previous teams will join together to analyse in-depth the development of the exercise and to carefully assess the VALKYRIES technologies, to detect the points or areas of improvement and incorporate them into the system.

**Demonstration scenario.** The Spanish-Portuguese CCUs receive several calls that alert of multiple fire hotspots near the towns of San Vicente de Alcántara and Portalegre. The first responders will be the local firefighters from both towns, who will start the systematic collection of information: Minimum Incident Data Set (CMDI). The first health teams arriving at the scene of the incident will confirm multiple victims and initiate health-related data collection, according to CMD Primary Triage (CMDT1). CMDI data confirms the intensity of the fire. Forecasted

risks linked to controlling the fire request emergency plan activation. Data are available on the number of victims distributed in 5 different locations on both sides of the border. 100 victims of various considerations are identified, with different affectations to their health: 60 green; 20 yellow; 15 Red and 5 black. Thanks to the information collected by CMDI and T1, the geolocation of victims and the images provided by drones, 3 advanced medical positions are located tactically to be able to receive the injured citizens coming from all the 5 spotlights. More resources are requested and hospitals in the area are consulted on the availability of beds in intensive care units. One hour after the start of the incident, CMD Secondary Triage (CMDT2) grants reliable information coming from the three advanced medical posts: confirmed 100 wounded (70 green; 10 yellow; 12 red and 8 black). Transportation to nearby hospitals is requested based on the availability of beds in intensive care units and fleet management. Smoke canisters in 5 strategically locations, distributed on both sides of the border Spanish-Portuguese border, will be used to simulate the incident. About 50 volunteers, 25 from each country, will pretend to suffer different clinical situations previously established by the multidisciplinary team 1 (planning). The number of casualties can increase to 100 injured using simulated patients in the VALKYRIES simulation bank. For this purpose, 20 patients will be created in advance for each triage category.

**Pre-standardization and regulatory context.** Autonomous communities in Spain are the governmental and administrative-territorial level in charge of emergency planning, including forest fires. However, collaboration is expected if several autonomous communities are involved, or regarding other neighbouring countries like Portugal. The lack of one common standardized protocol for both basic information collection and intervention and management strategies might be a challenge for the efficient management of such incidents, especially in bordering areas.

**Associated Risks.** As a computer application, risks might relate to technology failure, not receiving signal or logistics. However, the project has envisaged these situations to provide contingency measures for each case, to ensure that the VALKYRIES system will operate both analogic and digital. The vehicles of the first responders will create a communication network that will allow working synchronously or asynchronously, depending on the status and availability of the signal.

#### UC#2: Reassessment toxic threats for cross-border regions in Europe (Slovakia-Austria)

**Overview.** Toxic Chemicals Dumped in Danube and Morava Rivers on the border between Slovakia and Austria. Chemical waste products from agriculture or storage of nitrogen fertilisers may also be accidentally discharged into rivers.

**Location.** Water border between Slovakia and Austria – river Danube and river Morava, mapping all agriculture farms, chemical storage facilities and nearest waste dumps/ small industries that can eventually cause toxic pollution.

**Participants and Roles.** Bratislava Firefighters Forces, Burgenland Firefighters, Ministry of Interior of Slovakia, border municipalities and agriculture producers.

**Demonstration scenario.** Triggering situation (natural (including resulting from climate-related extremes) or man-made) and demonstration narrative related to the spill/dumped in the area alongside the river, polluting the riverbanks of two countries, early warning communication system, define contaminated area and effects on lives, nature and economy, evacuate people, clean the rivers, decontamination.

**Pre-standardisation and regulatory context.** Preliminarily foreseen standardisation and regulatory context: current situation: need audit of agriculture, industrial and dumps points on river Danube and tributaries, harmonisation of the methodology for the assessment of risks alongside the Slovak-Austrian borders, relationship with ongoing harmonisation of the UCPM requirements for enhancing the cross-border disaster risk management. Challenges: identify all possible risks and work with local communities and economic entities, development of joint cross-border risk management and early warning system and/or communication framework.

**Associated Risks.** We can identify lower involvement of economic entities whose economic activity is a subject of toxic/CBRN threat in the border region. Though we will involve those entities in long-term training and awareness activities and stimulate them in the development of company plans for monitoring situations in storages and avoiding any incidents.

**Additional Information.** <http://darenetproject.eu> and <https://www.icpdr.org/main/issues/nutrients>

#### UC#3: Cross-border crisis due to an earthquake (Bulgaria-Greece)

**Overview.** Cross-border crisis as an earthquake result in the border area between Bulgaria and Greece, causing a series of humanitarian crises and industrial accidents threatening the lives of the population in the Bulgarian-Greek border area.

**Location.** Southwestern Bulgaria-Greece border area. The town of Petrich and the Logodazh Dam on the Bulgarian territory.

**Participants and Roles.** The participants in this use case are: (1) The Bulgarian Red Cross and the Hellenic Red Cross providing assistance to affected population in the cross-border area, humanitarian aid and restoring family links; (2) Specialised nits from the Bulgarian Armed Forces and the and Hellenic Armed Forces as first responders in case of CBRN, emergency rescue and emergency recovery activities; (3) The Bulgarian Fire Brigade and Hellenic Fire Brigade – first responders implementing emergency rescue and emergency recovery activities; (4) The Bulgarian Police and the Hellenic Police – law enforcement agencies responsible for protection of public order; (5) The Bulgarian Emergency ambulance service and the Hellenic National Centre for Emergency



Assistance providing emergency medical aid; (6), Local authorities from Bulgaria and Greece providing logistical support and coordination; (7) State civil protection authorities responsible for management and coordination; and (8) the Hellenic Earthquake Planning and Protection Organization (EPPO).

**Demonstration scenario.** As a result of an earthquake with a magnitude of 6.5 on the Richter scale with an epicentre in the area of the town of Petrich (Bulgaria), there is a great number of affected population with a number of victims in the worst affected municipalities. Hundreds of families lost their homes; there is a severely damaged infrastructure, destroyed residential buildings, farm buildings and warehouses in the Blagoevgrad district (Bulgaria). The earthquake caused the destruction of a reservoir and the leakage of large amounts of the toxic substance acrylonitrile at a polymer plant in the town of Petrich. Besides, the integrity of the refrigeration system in vegetable refrigerated warehouses has been disrupted, due to large amounts of ammonia continue to leak. At the same time, as a result of heavy rainfall during the last 10 days, there have been significant spills and partial floods along the Struma and Mesta rivers on the Bulgarian territory. Almost all settlements in the regions along the two rivers are affected. There are unconfirmed data on the presence of a crack in the wall of Logodazh Dam, and its size and the degree of risk of its destruction have not been specified yet. The telephone connection, including the connection of the mobile operators, has been disrupted, which makes communication in the area difficult. A large part of the water supply network in the area of the epicentre of the earthquake was destroyed. The resulting panic among the population of the larger affected settlements such as the towns of Kresna, Sandanski and Melnik has led to the concentration of cars and trucks on their entry and exit roads and hinders the traffic. This is a result of the hundreds of citizens of the Hellenic Republic and the Republic of Northern Macedonia leaving the disaster area, vacationing in Sandanski, Melnik and other resorts in the southwestern part of the Republic of Bulgaria.

**Pre-standardisation and regulatory context.** The Greek regulatory framework for civil protection in case of disaster includes the National General Plan for Civil Protection, named “Xenokratis” (Ministerial Decision 1299/2003–Government Gazette 423 B/10-04-2003) and the National Special Human Loss Management Plan. For **earthquakes**, the regulatory framework also includes the General Action Plan for emergency response due to earthquakes with the code name “Egkelados” (General Secretariat for Civil Protection of Greece) and the Template Action Plan for emergency response due to earthquakes for the municipalities of the Hellenic territory (General Secretariat for Civil Protection of Greece). The Bulgarian regulatory framework for civil protection in case of disaster includes the Disaster Protection law (State gazette No 102/19.12.2006 and amendments, last from 7 July 2020), Disaster Risk Reduction strategy 2014-2020 and National and regional disaster protection plans. In case of **flood events** should also be considered the General Action Plan for emergency response and short-term management of floods impacts with the code name “Dardanos” (General Secretariat for Civil Protection of Greece); Floods Directive 2007/60/EC, which has been incorporated in the Greek National Law with the Joint Ministerial Decision 31822/1542/E103 (OGG B 1108/21.07.2010); Flood Risk Management Plan for the Water District of Eastern Macedonia; Flood Risk Management Plan for the Water District of Thrace; Water act (Bulgarian State gazette No 67/27.07.1999 and amendments) and the Bulgarian Flood Risk Management Plans. In case of a **technological accident**, the regulatory framework also includes ATEX 214 “equipment” Directive 2014/34/EU–Equipment and protective systems intended for use in potentially explosive atmospheres, which was incorporated in the Greek National Law with the PD128 (OGG9717 A 228/07.12.2016; ATEX 137 “workplace” Directive 1999/92/EC–Minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres, incorporated in the Greek National Law with the PD42 (OGG493 A 44/21.02.2003) and the General Action Plan for emergency response due to large scale technological accidents (General SATAME) with the code name “Herakleitos” (General Secretariat for Civil Protection of Greece). There is a need for harmonisation of the methodology and approaches for joint cross-border risk assessment on Bulgarian-Greece border based on the implementation of EU directives and requirements for enhancing cross-border disaster risk management.

**Scenario implementation.** The scenario will be implemented by two Bulgarian and two Greek partners (BDI, BRC, KEM and ARATOS). It is envisaged that some parts of the scenario will be implemented physically in the affected regions on the Bulgarian territory. Such are Water rescue / search for flood victims–the most suitable place Kresna Gorge; Search for victims of dog teams and Restoring family links. The other parts shall be simulated.

**Associated Risks.** Lack of proper level of coordination among the project partners responsible for the implementation of the scenario Evolving crisis with Covid-19 pandemic, which can hinder physical meetings and travel.

#### UC#4: Rescue of people and collection of pollution on sea in international waters (Norway-Netherlands-Denmark)

**Overview.** The European continent is surrounded by seawater, ranging from Black sea and Mediterranean in the south and east to North Sea and Arctic oceans in the north and west. In all these areas there are heavy traffic of passenger ferries/cruise, cargo boat and oil tankers. An accident with one or more ships in open sea will nearly always involve a range of different operations like rescue people, prevent oil-spill, secure values and so on. Most likely, there will be several different countries involved.

**Location.** The European continent is surrounded by water, but this use case is placed at the North Sea between Norway, Netherlands and Denmark.

**Participants and Roles.** PL: University of South-eastern Norway (USN). Contributors: Norwegian Coastal Administration (Maritime Authorities), Blockchain2050, and the rest of the VALKYRIES Consortium.

**Demonstration scenario.** Rescue operations and oil spill collection require cooperation between national authorities in different countries and a range of organizations like the coast guard, military rescue units (In Norway: Helicopter rescue team), civil rescue units (In Norway: Luftambulansen og Redningsselskapet) and the national rescue centres when people are involved. In the case of environmental issues like oil spill, typical organization operating collection equipment (Norwegian Maritime Authorities) will be applied together with privately operated vessels.

**Pre-standardization and regulatory context.** Rescue operations and oil spill collection require cooperation between national authorities in different countries and a range of organizations like the coast guard, military rescue units (In Norway: Helicopter rescue team), civil rescue units (In Norway: Luftambulansen og Redningsselskapet) and the national rescue centres when people are involved. In the case of environmental issues like oil spills, a typical organization operating collection equipment (Norwegian Maritime Authorities) will be applied together with privately operated vessels.

**Associated Risks.** The most considerable risk is the loss of lives due to the lack or loss of relevant information. Besides that, we may have large economic or environmental losses due to polluted shore areas, reduced fisheries, and destroyed fish farms. Finally, a wrong and late response may end in loss of cargo and vessels.

**Additional Information.** <http://darenetproject.eu> and <https://www.icpdr.org/main/issues/nutrients>

### 1.3.1.3. VALKYRIES measurable outcomes

Objective	Measurable Outcomes	Quantified Targets
<b>OBJ-1: Map of growing commercial and R&amp;D opportunities</b>	<ul style="list-style-type: none"> <li>• # of organisation/respondents participating in the requirements gathering activities</li> <li>• # of key compelling technologies, collaboration and procedures identified for support first aid EMS at disasters</li> <li>• # of contributions and proposals to the VALKYRIES' functional blocks resultant of the study</li> <li>• # of surveys, contributors, revisions and feedback received, mappings with other initiatives, etc</li> <li>• number of events in datasets collected from the evaluation and demonstration</li> <li>• number of observations in datasets collected from synthetically generated events</li> </ul>	<ul style="list-style-type: none"> <li>• 30+ organisations/ 50+ respondents involved in the requirements gathering activities; across 10+ main profiles (public/ private; academic/ research/ commercial; start-ups/ SMEs/ large organisations; operational level/decision-making)</li> <li>• 15+ large-scale enhancement opportunities and 20+ derived harmonisation actions</li> <li>• The management measures provided by VALKYRIES to the identified scenarios</li> <li>• 3+ surveys, 120+ contributors, 6+ revisions</li> <li>• 1000+ events in datasets from demonstrations</li> <li>• 1000+ synthetically generated events in datasets</li> </ul>
<b>OBJ-2: Sustainable Regulation and ethical compliance</b>	<ul style="list-style-type: none"> <li>• # of consultations asked in pursuing OBJs</li> <li>• # realistic operation tests</li> <li>• # workshops presentations with related stakeholders</li> <li>• # stakeholders involved in each workshop</li> <li>• acceptance of the deduced maps [0...10]</li> <li>• # ESLA related opportunities identified</li> <li>• # Novel regulatory actions initiated</li> <li>• # Local/EU related agencies and NOGs in which VALKYRIES contributed</li> <li>• # of post-project opportunities identified</li> </ul>	<ul style="list-style-type: none"> <li>• 30+ short consultations issued</li> <li>• 3+ actual tests' short report</li> <li>• 4+ workshops' short report</li> <li>• 8+ stakeholders from SME, institutions, large companies and regulators</li> <li>• 7+ acceptance of de deduced maps</li> <li>• 15+ ESLA new opportunities</li> <li>• 10+ novel regulatory actions initiated</li> <li>• 10+ agencies on which contributes</li> <li>• 10+ post-Project Opportunities</li> </ul>
<b>OBJ-3: Sustainable Pre-standardisation and Standardisation</b>	<ul style="list-style-type: none"> <li>• # of consultations asked in pursuing OBJs</li> <li>• # realistic operation tests</li> <li>• # workshops presentations with related stakeholders</li> <li>• # stakeholders involved in each workshop</li> <li>• acceptance of the deduced maps [0...10]</li> <li>• # Pre-standardisation related opportunities identified</li> <li>• # Novel standardisation actions initiated</li> <li>• # Local/EU related standardisation committees contributed</li> <li>• # of post-project opportunities identified</li> </ul>	<ul style="list-style-type: none"> <li>• 30+ short consultations issued</li> <li>• 3+ actual tests' short report</li> <li>• 4+ workshops' short report</li> <li>• 8+ stakeholders from sector</li> <li>• 7+ acceptance of de deduced maps</li> <li>• 15+ standardisation new opportunities</li> <li>• 5+ novel standardisation actions initiated</li> <li>• 10+ agencies on which contributes</li> <li>• 10+ post-Project Opportunities</li> </ul>
<b>OBJ-4: Sustainable certification and conformity assessment criteria</b>	<ul style="list-style-type: none"> <li>• # of consultations asked in pursuing OBJs</li> <li>• # realistic operation tests</li> <li>• # workshops presentations with related stakeholders and experts</li> <li>• # stakeholders involved in each workshop</li> <li>• acceptance of the deduced maps [0...10]</li> <li>• # of certification gaps/challenges identified</li> <li>• # of certification requirements identified</li> <li>• # platforms and access policies formally identified</li> </ul>	<ul style="list-style-type: none"> <li>• 30+ short consultations issued</li> <li>• 3+ actual tests' short report</li> <li>• 4+ workshops' short report</li> <li>• 8+ stakeholders from SME, institutions, large companies and regulators</li> <li>• 7+ acceptance of de deduced maps</li> <li>• +24 gaps discovered</li> <li>• +24 new certification requirements</li> <li>• +10 platforms and access policies</li> </ul>

	<ul style="list-style-type: none"> <li>• # of new capabilities to be used in labs</li> <li>• # interoperability and possible joint usage of labs</li> <li>• # harmonised conformity assessment criteria</li> <li>• quality level of proposed recommendations, tactics and guidelines [0...10]</li> </ul>	<ul style="list-style-type: none"> <li>• +10 new capabilities for labs</li> <li>• +9 labs interconnected labs</li> <li>• +12 novel conformity assessment criteria</li> <li>• Average satisfaction level <math>\geq 7</math> for stakeholders consulted</li> </ul>
<b>OBJ-5: Sustainable Harmonisation framework</b>	<ul style="list-style-type: none"> <li>• # of consultations asked in pursuing OBJs</li> <li>• # realistic operation tests</li> <li>• # workshops presentations with related stakeholders</li> <li>• # stakeholders involved in each workshop</li> <li>• acceptance of the deduced maps [0...10]</li> <li>• # harmonisation opportunities</li> <li>• # new harmonisation procedures</li> <li>• # guidelines and recommendations</li> <li>• # lessons learned</li> <li>• # reference solutions harmonised</li> <li>• acceptance of the harmonisation tactics [0...10]</li> </ul>	<ul style="list-style-type: none"> <li>• 30+ short consultations issued</li> <li>• 3+ actual tests' short report</li> <li>• 4+ workshops' short report</li> <li>• 8+ stakeholders per sector</li> <li>• 7+ acceptance of de deduced maps</li> <li>• 30+ harmonisation opportunities</li> <li>• 150+ new harmonisation procedures</li> <li>• 7+ guidelines and recommendations</li> <li>• 7+ lessons learned</li> <li>• 12+ reference solutions harmonised</li> <li>• 7+ acceptance on the harmonisations</li> </ul>
<b>OBJ-6: Harmonisation of vehicular first aid technologies, procedures and collaboration</b>	<ul style="list-style-type: none"> <li>• # reference technologies harmonised</li> <li>• # reference procedures harmonised</li> <li>• # reference education/training capabilities harmonised</li> <li>• Minimal quality of the conducted harmonisations</li> <li>• acceptance of the reference harmonisation [0...10]</li> <li>• innovation potential of the harmonised solutions</li> <li>• successfulness on the conducted validations</li> <li>• successfulness on the conducted verifications</li> </ul>	<ul style="list-style-type: none"> <li>• 6+ technologies harmonised</li> <li>• 6+ procedures harmonised</li> <li>• 6+ education/training capabilities harmonised</li> <li>• quality of the harmonisations defined at D7.2</li> <li>• 7+ acceptance of the harmonisations</li> <li>• innovation potential to be defined at D7.2</li> <li>• successfulness of validations as depicted at D7.2</li> <li>• successfulness of verifications as depicted D7.2</li> </ul>
<b>OBJ-7: Cross-sectorial collaboration, civilian protection, volunteering and military assistance</b>	<ul style="list-style-type: none"> <li>• # reference collaboration capabilities with cross-sectorial response teams harmonised</li> <li>• # reference collaboration capabilities with Civilian Protection and/or Volunteering actions harmonised</li> <li>• # reference civil-military collaboration capabilities</li> <li>• minimal quality of the conducted harmonisations</li> <li>• innovation potential of the harmonised solutions</li> <li>• successfulness on the conducted validations</li> <li>• successfulness on the conducted verifications</li> <li>• Acceptance of the collaborative harmonisation [0...10]</li> </ul>	<ul style="list-style-type: none"> <li>• 10+ reference cross-sectorial collaboration capabilities reference harmonised</li> <li>• 6+ reference collaboration capabilities with Civilian Protection and/or volunteering reference harmonised</li> <li>• 6+ reference civil-military collaboration capabilities reference harmonised</li> <li>• innovation potential to be defined at D7.2</li> <li>• successfulness of validations as depicted at D7.2</li> <li>• successfulness of verifications as depicted at D7.2</li> <li>• 7+ acceptance on the harmonisations</li> </ul>
<b>OBJ-8: Reference integration and interoperation</b>	<ul style="list-style-type: none"> <li>• Operational VALKYRIES integration tested and deployed</li> <li>• Readiness of the target architecture, APIs and interfaces to support scalability, reusability, expandability and interoperability by design</li> <li>• # of concurrent users</li> <li>• IT investment per unit of revenue</li> <li>• Event processing performance</li> <li>• # of data source types that VALKYRIES can integrate.</li> <li>• Real-time analytic processing.</li> <li>• Adaptation tactics effectiveness</li> <li>• Scheduling forecast effectiveness</li> <li>• Resource Allocation and optimization of equipment usage</li> <li>• Level of satisfaction of EMS practitioners [0...10]</li> <li>• Other performance indicators will be indicated at D7.2 as part of the proposed Evaluation Methodology</li> </ul>	<ul style="list-style-type: none"> <li>• Availability and proper operationality of VALKYRIES on the demonstration scenarios</li> <li>• Successful validation results in agreement with the validation and evaluation methodology (T6.1)</li> <li>• Scalability to 100+ users</li> <li>• 1,2€ revenue per 1€ of IT investment</li> <li>• Event rate 100000+ eps</li> <li>• SIGRUN will be able to integrate 10+ different input data streams from 10+ different sources.</li> <li>• 1/sample rate at real-time AI and policy evaluation.</li> <li>• 90% hit rate when identifying the best suitable CoAs.</li> <li>• Better scheduling forecast by 20%</li> <li>• Reduction of operational costs by 20%</li> <li>• User acceptance level <math>\geq 7</math></li> </ul>
<b>OBJ-9: Large EU scale cross-border demonstrations</b>	<ul style="list-style-type: none"> <li>• Compelling digitalisation and building relevant use cases</li> <li>• # Countries involved per demonstrator</li> <li>• Level of satisfaction of EMS practitioners [0...10]</li> <li>• Level of satisfaction of participant authorities [0...10]</li> <li>• Level of satisfaction of other stakeholders invited [0...10]</li> </ul>	<ul style="list-style-type: none"> <li>• 4 Demonstrations on real cross-border scenarios</li> <li>• 2+ countries involved per scenario</li> <li>• Satisfaction level <math>\geq 8</math> for practitioners</li> <li>• Satisfaction level <math>\geq 8</math> for participant authorities</li> <li>• Satisfaction level <math>\geq 7</math> for other stakeholders invited</li> </ul>
<b>Communication</b>	<ul style="list-style-type: none"> <li>• # of VALKYRIES workshops organised and #</li> </ul>	<ul style="list-style-type: none"> <li>• 3 Workshops with 30+ attendees</li> </ul>

<b>and Dissemination</b>	<ul style="list-style-type: none"> <li>attendees</li> <li># of VALKYRIES Ethical/Legal workshops organised and number of attendees per workshop</li> <li># of VALKYRIES Standardization workshops organised and number of attendees per workshop</li> <li># of liaisons with national and EU projects</li> <li>Share of women in workshops</li> <li>Ranking and number of publications or conference/event</li> <li>VALKYRIES' online presence with a website and social media channels ready by M1, promotional videos (1/year) and promotional materials</li> <li>of citations to Open Access publications</li> <li>takeholders committed with external advisory boards</li> </ul>	<ul style="list-style-type: none"> <li>4 Legal/Ethical Workshops with 15+ attendees</li> <li>3 Standardization Workshops with 15+ attendees</li> <li>5+ liaisons with EU projects</li> <li>25%+ of women per workshop</li> <li>30+ publications/events (10+ top rank)</li> <li>VALKYRIES online presence KPIs (500 unique website visitors/year, 500 LinkedIn/Twitter followers/Facebook Fans), 100+</li> <li>Tweets/LinkedIn posts and 150 FB posts</li> <li>10+ press releases, factsheets and success stories</li> <li>newsletters</li> <li>experts active involved per EAB</li> </ul>
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#### 1.3.1.4. Technology Readiness Levels (TRL) of the VALKYRIES project

The expected contributions of VALKYRIES to specific technical areas are measured using the Technology Readiness Level (TRL) metric defined by the EC. The table below summarises the VALKYRIES contributions on TRL, from the existing maturity of the current technologies and solutions to the ones expected in VALKYRIES.

Area	TRL	Description/Justification
<b>Ethics and Regulation</b>	From current TRL 5 to expected TRL 7	Many tools have been developed to help manage GDPR and other related regulations compliance, few of them being adopted by first aid responders (TRL 5-7). Although some of them may be preliminarily deployed on disaster environments, none of them has been harmonised by following the VALKYRIES rationale harmonisation process nor interoperated with most of the beyond state-of-the-art capabilities to be interconnected as part of the project's reference integration. VALKYRIES will integrate, validate and verify in large-scale demonstrations these tools as components of a larger interconnected platform able to drive innovators in the required continuous balancing exercise between the need to guarantee fundamental rights in each enabled data flow (TRL 7).
<b>Standardisation</b>		State of the art provides COTS solutions for partially supporting and guiding pre-standardisation and standardisation actions, most of them general-purpose bringing collaborative environments and/or allowing sharing related information. None of them has been adapted to the rationale decision-making paradigm to be developed by VALKYRIES nor for harmonising the disruptive capabilities to be deployed during the reference integration. VALKYRIES will integrate, validate and verify during a large-scale demonstration some of these tools (TRL 7).
<b>Certification</b>		There are few tools and facilities that allow compliant capabilities to obtain and display temporal/permanent accreditation confirming its conformance with specific standards/regulations (TRL 5-7), some of them allowing to guide the preparedness of the certification documentation, with assessment criteria and tests. VALKYRIES will evolve some of them in the context of the reference integration towards accommodating harmonisation and satisfying given certification requirements on the selected disruptive capabilities. They will be verified at the project's demonstration scenarios (TRL 7).
<b>Harmonisation</b>	From current TRL 4 to expected TRL 7	The harmonisation process is a multidisciplinary process where cross-sectorial experts with heterogeneous competence shall contribute; for which state of the art provides supportive COTS tools centred in cataloging, analysing, information exchange, etc. (TRL 4). They take advantage of morphological (segmentation, lemmatisation, parsing, etc.), semantics (lexical semantics, machine translation, named entity recognition), automatic summarisation; which in the context of VALKYRIES will be adapted to the introduced harmonisation processes centred in solutions for first aid responders at disaster situations. These evolutions will be verified at a preliminary stage of the reference integration, which results will be deployed at the demonstrations (TRL 7).
<b>Technologies and Equipment</b>		In the context of the VALKYRIES' reference integration and demonstration, a subset of the technological opportunities identified at the project scoping stages (TRL 4-7) will be selected and harmonised towards facilitating the fulfillment of the Consortium's end-users' requirements (T2.1). They will be adapted according to the VALKYRIES' rationale harmonisation processes, being their operability with other first aid EMS assets validated and demonstrated, among others by the project demonstrators (TRL 7).
<b>Common Practices and Operational Procedures</b>		VALKYRIES will leverage existing technological enablers that support common first aid EMS practices and related operational procedures (TRL 4-7), adapting them to suggested harmonisations of protocols and procedures. These tools will be verified, among others, during demonstrations (TRL 7).



<b>Cooperation and resource federation</b>	Although state of the art provides a large portfolio of COTS capabilities for cooperation and resource federation (TRL 4-7), none of them have been rationally harmonised in the context of first aid responses on disaster scenarios (ad hoc communications, BLOS, etc.), while enabling cross-sectorial, cross-border and cross-hierarchical collaboration (civil-military cooperation, volunteering, etc.). VALKYRIES will adapt and verify them at real demonstration (TRL 7).
<b>Education and Training</b>	The project will explore the applicability of state of the art and beyond tools for educating and training first aid response teams and collaborators (e.g., healthcare volunteers) (TRL 4-7). They shall at least serve to prepare the participants of the large-scale demonstrators towards taking advantage of the harmonised solutions integrated with their conventional capabilities (TRL 7). They will be verified and proved at an early stage of the demonstrations, as well as registering their user acceptance (TRL 7).
<b>Reference Integration</b>	VALKYRIES will take advantage of COTS testbed, integration developing frameworks, code repositories, unity test tools, etc., to facilitate the project's reference integration, based on the recommendations and guidelines deducted from the harmonisation framework (TRL 4-7). They will be configured and adapted towards satisfying the Consortium's end-user expectations, where the outcomes will be validated and verified during the project's cross-border demonstrations.

### 1.3.1.5. Relation with other projects and initiatives

<b>VALKYRIES relationship and potential synergies with other projects</b>
<b>STRATEGY</b> ( <i>Facilitating EU pre-Standardisation process Through stReamlining and vAlidating inTeroperability in systems and procEdures involved in the crisis manaGement cYcle</i> ) [STR19] will develop a pan-European framework of the pre-standardisation activities for systems, solutions and procedures, addressing crisis management, and disaster resilience capabilities, including EDA initiatives in the CBRN-E area. Some VALKYRIES' partners (KEM) participate in STRATEGY, which outputs are expected to support the scoping analysis, identification of opportunities, definition of harmonisation tactics, etc. with VALKYRIES being particularly focalized on the cross-border, cross-sector and cross-hierarchical first aid actuations.
<b>FASTER</b> ( <i>First responder Advanced technologies for Safe and efficienT Emergency Response</i> ) [FAS18] will examine the impact and the role first responders can have in cases of disasters. It will take into consideration the entire lifecycle of emergency preparedness and response, including the planning, logistical support, maintenance and diagnostics, training and management; which settled a perfect baseline for the VALKYRIES project. However, VALKYRIES will extend these outcomes towards normalisation and harmonisation, with a clear focus on first aid actuations at cross-border disasters. SMS participates as end-user at FASTER.
<b>AQUA3S</b> ( <i>Enhancing Standardisation strategies to integrate innovative technologies for Safety and Security in existing water networks</i> ) [AQU18] aims to standardise existing sensor technologies complemented by state-of-the-art detection mechanisms for drinking water networks. It will combine complex sensors with videos from unmanned aerial vehicles (UAVs), satellite images and social media observations from citizens reporting low-quality water. Although VALKYRIES focuses on first aid actuations on disasters, AQUA3S will explore technological and procedural capabilities that may support the VALKYRIES' scoping analyses.
<b>NEXES</b> ( <i>NEXt generation Emergency Services</i> ) [NEX14] researches, tests and validates the integration of IP-based ICTs and interoperability into the next generation emergency services. It demonstrates advances in the integration with 112 operation mobile apps and data exchange between citizens, 112 operators and first responders. Some VALKYRIES' partners (PARTICLE) participated in NEXES, which outputs are expected to feed the technological and collaborative streams of VALKYRIES.
<b>ResiStand</b> ( <i>Increasing disaster Resilience by establishing a sustainable process to support Standardisation of technologies and services</i> ) [RES16] contributes to improved disaster resilience by analysing the drivers, constraints and expectations of Standardisation Organisations, End-Users and Suppliers, consisting of researchers, industry and SMEs. This entails a baseline for VALKYRIES, the latter focalized on first aid actuations, and moving ahead towards harmonisation, including regulatory and certification aspects.
<b>beAWARE</b> ( <i>Enhancing decision support and management services in extreme weather climate events</i> ) [BEA15] aims to provide support in all the phases of an emergency incident. It proposes an integrated solution to support forecasting, early warnings, transmission and routing of the emergency data, aggregated analysis of multimodal data and management the coordination between the first responders and the authorities. They will be studied and if required harmonised towards support first aid responses on cross-border disaster scenarios.
<b>CARISMAND</b> ( <i>Culture And RiSkmanagement in Man-made And Natural Disasters</i> ) [CAR14] explored the existing gaps and opportunities for improvement of disaster policies and procedures, developing a comprehensive toolkit that will allow professional as well as voluntary disaster managers to adopt culturally aware everyday practices. VALKYRIES will revise these findings in the context of first aid responses on a cross-border disaster, including their implications concerning regulation, ethics, certification and standardisation.
<b>DARWIN</b> ( <i>Expecting the unexpected and know how to respond</i> ) [DAR14] aims to develop European resilience management guidelines. These will improve the ability of stakeholders to anticipate, monitor, respond, adapt, learn and evolve, efficiently in the face of crises.
<b>LINKS</b> ( <i>Strengthening links between technologies and society for european disaster resilience</i> ) [LIN19] will develop a framework that can be used to understand, measure and govern social media and crowdsourcing for disasters for improved

information gathering and collaboration across European communities. VALKYRIES covers related topics in the context of information sharing and collaboration, hence the outcomes of LINK may serve as VALKYRIES' import but adapted to the needs of the first aid responses.
<b>FIRE-IN</b> ( <i>Fire and Rescue Innovation Network</i> (pan-European Networks of practitioners and other actors in the field of security)) [FIR17] has been designed to raise the security level of EU citizens by improving the national and European Fire & Rescue (F&R) capability development process. The network will be linked at a cross-domain and cross-border level. It will feed harmonised operational requirements (or challenges) into national and EU capability development, i.e., R&D, procurement and standardisation programmes. KEM is involved.
<b>MEDEA</b> ( <i>Mediterranean practitioners network &amp; capacity building for effective response to emerging security challenges</i> ) [MED18] is a pan-European Network of practitioners and other actors in the field of security. MEDEA will form a Mediterranean and Black Sea (M&BS) security practitioners' network for an effective response to emerging challenges, aiming to establish and operate a multi-disciplinary network of security practitioners, with active links to policymakers and users/providers of security innovations across the M&BS countries focusing in border protection and other security and disaster-related tasks; engage participants in anticipatory governance on emerging security; push for the co-creation of security technology and capabilities innovations between practitioners and innovation suppliers; establish and annually update the Mediterranean Security Research and Innovation Agenda. KEM is the coordinator of MEDEA.

### 1.3.2. Methodology

The VALKYRIES development methodology will assume straightforward scientific methodology through its life cycle, structured in four main blocks directly aligned with the VALKYRIES core actuation loop (Section 1.3.1.1): *Project Pillars and Harmonisation* (WP2); the cross-cutting *Normalisation and Exploitation*: ELSA, Certification and Exploitation actions (WP3); *Technological, Procedural and Collaborative* working streams (WP4-WP6); and *Validation and Verification*, with the reference integration and demonstrations (WP6). Their execution will be feed by the project coordination, risk management, quality of assurance and other governance procedures (WP1). In line with the Project Implementation plan, the Consortium foresees to follow an overall iterative development approach, where each previous phase will be revised to adjust possible changes that might have been identified during later or parallel phases (see Figure 5). In agreement with the OODA-based harmonisation vision, the normalisations, working streams and validations may overlap, so the reasoning loops (Section 1.3.1.1) can be performed. To fit with the project schedule, based on the feedback received from the external advisors at the, a final iteration of the reasoning loop will be conducted, which iteratively will close all the project stages. During the Design Principles and Harmonisation phase (WP2), the project will establish the system and operational requirements and scope of demonstration scenarios (D2.1), taking into account the current state of the art, existing market solutions and direct consultation to the project stakeholders and external advisory groups. At the end of M1, the *Consultation Strategy* (D1.7) will be agreed and delivered, which shall be followed through the rest of the project. It will define the aims and objectives of the queries (*Planning*), the consultation actions to perform (*Process*), how the project information and feedback will be managed (*Presentation*), and how to establish a longer-term relationship of mutual benefit and trust with stakeholders (*Promise*) that may support the normalisation and regulatory actions.

Figure 4 illustrated the preliminary agreed VALKYRIES consultation cycle, which describes a loop initiated once new information to be requested is identified by the Consortium, followed by the identification of the proper stakeholders to be consulted, the decision of the best suitable consultation method and tools, the compilation and documentation of the consultation outcomes, and the revision, refinement and update of the acquired information. On these ground, standardisation and harmonisation plans will be constructed (D2.5), the project joint Terminology and Semantics will be agreed (D2.2), and the VALKYRIES Overarching Architecture (OA), which will be served as the backbone of the reference integration activities. This architecture will describe all APIs, interfaces between modules in the architecture and the traceability of its subsystems' dependencies. On the other hand, it will embrace the definition of the assumed audition and self-protection mechanisms, as well as the privacy and data protection management procedures to be implemented. The design will assume a use case driven methodology aiming at integrating the capabilities that facilitate to mitigate the requirements/needs prioritized by the end-users and practitioners within de Consortium, which demonstration will guide the definition of the demonstrations.

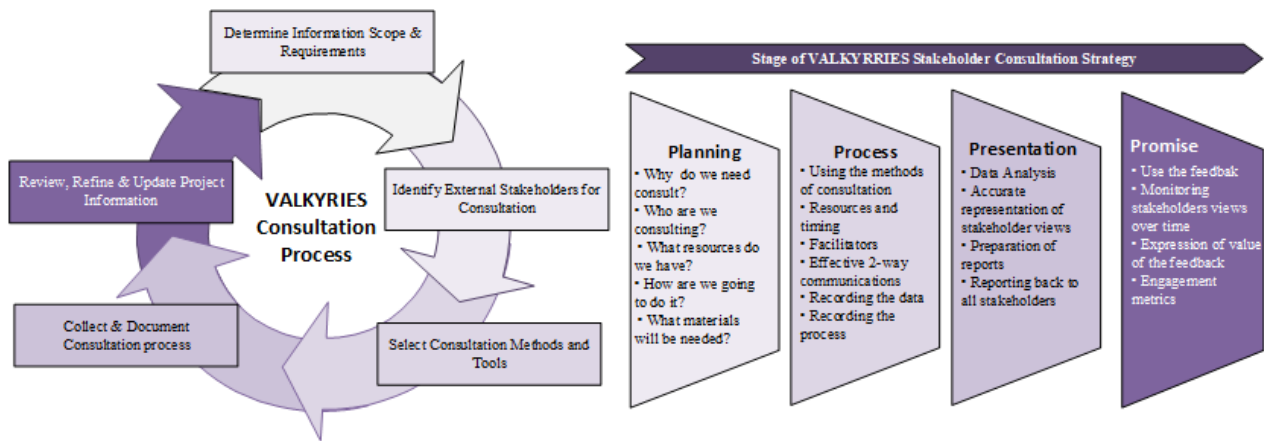


Figure 4: VALKYRIES Consultation Strategy

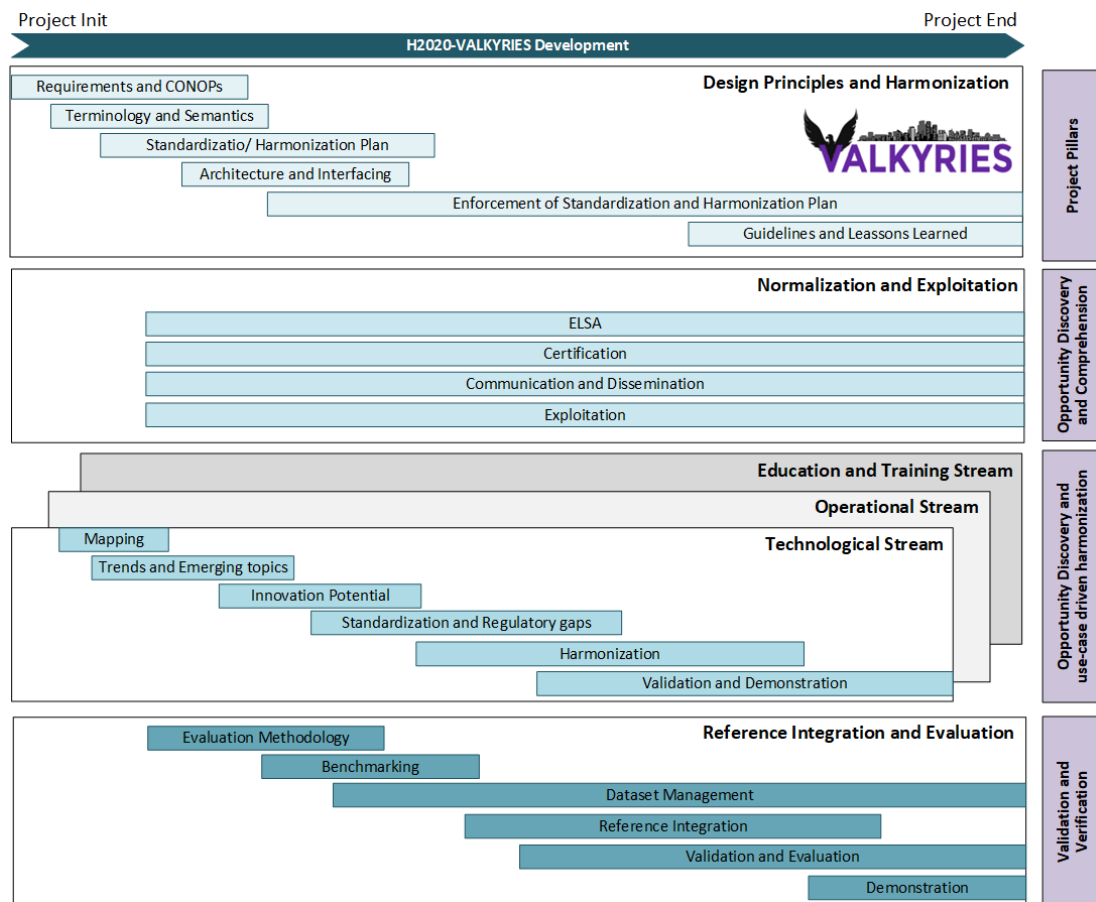


Figure 5: Project Development Methodology

At **Normalisation and Exploitation** stage (WP3), VALKYRIES will identify and explore the opportunities on major guarantee the compliance of the first aid response solutions on ethical, legal and societal aspects (D3.1) resulting in a minimum set of requirements, recommendations for policymakers, developer, suppliers and other stakeholders. This also includes the VALKYRIES participation in related committees, working groups, and the active initialisation of pre-regulatory actions, suggestion of novel certification/needs (including testing, facilities, and assessment criteria). The block also covers the exploitation and IPR related action of the consortiums towards guaranteeing the continuity and revenue on the project outcomes. The **Reference Integration and Evaluation** phase will preliminarily design a novel Evaluation Methodology able to assess both the effectiveness of the enforced harmonisations and the ability of the Interoperation of reverently integrated solutions towards addressing the targeted needs (D7.4). This will be accompanied by defining a baseline benchmarking procedure and generating supportive datasets (synthetically, and directly collected at real operational environments and/or demonstrations) (D7.1). Then the reference integration will

be conducted, validated, evaluated and demonstrated on large-scale cross-border scenarios supported by real end-users and practitioners, which will also share their acceptance to the project outcomes. Aiming at produce technological agnostics results and provide a close to general-purpose view easily adaptable to further related harmonisation actions, at least the following principles will be embraced thorough the reference integration (they will be assumed by design at WP2): **Layered architecture, Extensibility, Expandability, Interoperability, Multi-level scalability, Privacy and data protection, security, Ethics and trustworthy AI** [ECG19].

In accordance with Articles 2 & 3 of the Treaty of Amsterdam (1997), followed by the Treaty of Lisbon (2008) that officially prescribed gender mainstreaming, as well as other EU policy directives (such as “COM (96) 67 final” for incorporating equal opportunities for women and men into all community policies and activities) and reports (e.g., “EUR 2022” for Gender Impact Assessment in Research), **the project’s Consortium is committed to incorporating the principles of gender mainstreaming by using the Gender Impact Assessment (GIA) framework.** Although the research activities and technologies dealt with herein do not have the qualities of sex or gender, the bias could potentially creep into the work is through our communication to our stakeholders by soliciting feedback from them. Consequently, we will endeavour to ensure this is not the case and follow best practices such as the checklist published by the EC. VALKYRIES is committed to promoting equal employment opportunities and aims to establish a program of actions to make the H2020 gender and equality policy fully effective. It encourages balanced participation of women/men at all levels in its teams of innovation as well as in its management structure. Although VALKYRIES’ topic cannot be considered gender relevant, one of our primary purposes is to integrate gender awareness into the project’s processes and systems. **VALKYRIES will foster employment of more women among the developing staff to balance the current situation, considering gender issues in recruitment practices, while ensuring flexible working hours and other family-friendly policies within the Consortium. It will establish a system for monitoring gender equality in mobility schemes, which causes a subsequent impact on professional careers.** In the project activities and workshops, VALKYRIES will ensure an equal gender balance in the profile of the invited participants and speakers. Gender issues will also be considered in the impact assessment. Possible actions against institutions that are not respecting the above principles will even be foreseen. The gender dimension will be treated within WP1, where the management task is mainly assigned to the Project Coordinator, and where a specific task T1.2 (“Quality assurance, Regulatory Compliance and Diversity Management”) has been included as a priority aspect and operated by a VALKYRIES gender and diversity manager. Sex and gender equality actions like training on gender issues shall be envisaged.

## 1.4. Ambition

### 1.4.1. Advance beyond the state-of-the-art

Below are detailed the existing gaps in the state-of-the-art related to the blocks in which VALKYRIES focuses:

#### **Challenge 1. Rational decision-making on harmonization decisions able to faster the normalization of disruptive solutions, most effective stakeholder engagement, and support divergent and future thinking**

**Existing gaps in the State-of-the-Art:** Among the interested parties in the normalization processes, regulators have an essential role to play, so it is important that their decisions relay on the rationale and future thinking, thus making them understandable by the persons engaged while facilitating their ability of cross-sectorial project the consequences of their decision (benefices/cons). As indicated by Throckmorton [WEI13], factors like the level of regulatory development of the participant MS may vary their interest in the harmonization activities. Among the methodological harmonization gaps to be addressed it is important to highlight the difficulty of the related agencies on acquiring the scientific expertise to regulate the cutting-edge products emerging from many scientific, technological and procedural specialties [BAM19]. On the other hand, regulatory actions need to be able to evaluate such innovative products so that their first response to them is not overly conservative, which increases when adopting disruptive solutions. Finally, it is important to assume that the harmonization shall not only affect the normalization and interoperability of the targeted solutions, but also ensure their acceptance which reveals a need for rational/comprehensive methods able to faster the adoption of disruptions [SON20]. **Progress beyond the State-of-the-Art:** VALKYRIES will explore the adaptability of the OODA loop towards closing the gap on the above harmonization challenges and beyond (T2.5). This method will be designed, developed and validated for allowing fast decision-making under uncertainty situations (as is the case of disaster scenarios) and dynamically transforming them based on their effectiveness and the evolution of the operational environments. As indicated in Section 1.3.1.1,



the flexibility that this approach provides shall facilitate the commitment of experts and other stakeholders even if they are late on the harmonization discussions. The adapted OODA core approach will be seconded by Convergent-Divergent reasoning tactics and future thinking mechanisms, from which future-oriented alternatives (disruptions, possible evolutions of the operational environments, risks, etc.) will converging on the 'best' and most sustainable opportunity decision-makers may consider. Finally, VALKYRIES will provide guidelines and recommendations for facilitating the harmonization at new capability through the development life cycle, while lean learning procedures will be deemed to facilitate the information exchange between participants in the harmonization processes.

**Challenge 2. Dynamic assessment of changes in the common harmonization and regulatory requirements, and inference of cross-cutting propagations at different time horizon**

**Existing gaps in the State-of-the-Art:** EMS related product designs and developments are primarily driven by needs and stakeholder requirements. The overall quality and performance of a product can be gauged by how well it satisfies these requirements, which translate stakeholder expectations into objective statements and specify how each expectation will be satisfied. Requirements are also used as benchmarking tools to evaluate the capability and trustworthiness of existing solutions [HEI18]. In this context, the ability to assess a requirement change, predict its propagation, and assess the impact early in the design process will enable engineers to make informed decisions regarding change implementation. State of the art on solutions for understanding requirement change propagation analysis presents important gaps, especially those concerning the role of the requirements in the harmonization processes and the regulatory decisions made. There is a lack of solutions for evaluating the applicability between changes in the requirements and their dependencies with the decisions made, none of them being rationalized and demonstrated and validated by large communities of stakeholders and cross-border demonstration scenarios [ZHA14]. This impairs the wide use of these dependency types for both dependency identification and change propagation analysis; also complicating to have them into account at operational decision-making on real disaster situations. **Progress beyond the State-of-the-Art:** As described and illustrated in Section 1.3.1.1, VALKYRIES is going to deepen into the horizontal and vertical propagation of the analysed divergences, including their changes and consequences (T2.5). Part of these divergences may derive from new common requirements needs (Convergence) or the appearance of new opportunities at some of the elements to be harmonized (Divergence), which are expected to propagate to cross-border, cross-sector and cross-hierarchical conditions. The project will design, implement and validate rational reasoning tactics (convergence/divergence, future thinking, etc.) towards facilitating the early identification of changes in the normalization decisions (classification, likelihood, impact dimensions, etc., and their potential impact at different planes, ranging from prompting new harmonization actions up to their propagation to the operational plane. Each decision will be abstracted as a Course of Action (CoA) within the harmonization OODA-based approach introduced by VALKYRIES. Consequently, beyond the conventional harmonisation reports, the decision Rational will point out the decisive conditions appropriate for their success, related planning concepts (inputs, dependences, etc.), short-mid-large term projection, benefits/drawbacks and any contextual issue to be assumed when the first aid EMS rely on related harmonised solutions. From the ethic-legal perspective, VALKYRIES will identify the principles and requirements that advance the implementation, in terms of data sharing and interoperability standards.

**Challenge 3. Dynamic representation through metadata of the tacit knowledge associated with the effectiveness of the technological/procedural harmonisations once deployed on the operational environment**

**Existing gaps in the State-of-the-Art:** The digitalisation of the first aid responses bring disruptive procedural capabilities that shall coexist with conventional and legacy methodological approaches capable of solving complex problems, enhancing the current real-time decision-making capabilities, and obtaining reliable results in a consistent manner, such as reasoning systems based on rules, models, cases and frameworks, or the roll of the automatisms on tactical decisions. Although the design of this ecosystem of opportunities varies considerably, most of them are focused on using the data collected during previous operations or simulations to raise the understanding of both digital-driven responses and their environment. However, these knowledge models require further research to optimize the collaboration between them and their experienced users, prompting significant gaps in terms of regulation and harmonisation. In this context, it is expected that to gather information (performance indicators logs, etc.) about the effectiveness of the harmonisation results (beyond raw technological, operational indicators) may significantly enhance the opportunity if taking advantage of digital solutions towards improving regulatory/harmonisation decision-making, as well as supporting related human decisions-made [KOL18]. **Progress beyond the State-of-the-Art:** VALKYRIES will explore, design, develop and validate an ontological knowledge representation (T2.2) centred in the assessment and support to regulation and decision-making, which will define factual, operational and metacognitive information associated to the regulatory and harmonisation of first aid response solutions. This representation will assume the inherent multi-domain nature of the disaster response actuation, resembling a reasoning framework able to observe and register as metadata information related to the effectiveness and acceptance of the decisions made, which will be dynamically collectible on the operational environment. With this purpose, each working stream (WP4, WP5, and WP6) will emphasise the potential key performance indicators to be considered per opportunity group, some of them being implemented as part of the reference integration and contributing to the verification and demonstration of the rest of the project outcomes.

<p>VALKYRIES will also explore the use of automatisms (e.g., pattern recognition, prediction, diagnostic and other AI-based tools) that may take advantage of these outcomes' standardisation and harmonisation.</p>
<p><b>Challenge 4. Cross-sector, cross-border, cross-hierarchy interconnected information management for first aid responses and facilitate the acquisition of a Common Operational Picture</b></p>
<p><b>Existing gaps in the State-of-the-Art:</b> As highlighted by the EU Mandate M/487, Europe is not yet at a stage where we can interconnect information management systems from different organizations to share situation assessment or automate coordinated response procedures [ECM13]. For many reasons (political considerations, concern about the confidentiality of the information, competition or conflicting objectives between organizations, etc.) there is no willingness to establish direct interconnection, but rather a need to utilise human interfaces between systems (i.e., liaison officers between organizations). This understanding means that technical solutions should be incremental solutions, in a step by step approach, as enablers of communication needs. A core problem in EMS communication is the scattered health data, which shall be correlated with information gathered on the operational environment. This leads to a lack of common situational awareness for professionals and incomplete medical histories for patients. The reasons behind those problems are different information systems that do not communicate with each other and the lack of a common electronic patient care record (ePCR) for use by stakeholders. <b>Progress beyond the State-of-the-Art:</b> The technological, procedural and collaborative opportunities (D4.1, D5.1, D6.1), normalization challenges (D4.2, D5.2, D6.2) on cross-sector, cross-border, cross-hierarchy interconnected information management for first aid responses and facilitate the acquisition of a Common Operational Picture will be addressed by the different VALKYRIES working streams. This challenge will be particularly present in the reference integration (SIGRUN) of the project, which specifically will rely on distributed computing and information management capabilities for supporting its Subsystem of Command and Control Application (presenting its information processed in geographic, tabulated or report support) and Subsystem Application for Communication (manages the communications between the participants, by means of messages and/or by voice, through the different devices integrated into the platform). The platform will enable the acquisition of a harmonized Common Operational Picture based on the shared situational awareness.</p>
<p><b>Challenge 5. Cross-sectorial and cross-hypercritical semantics and organizational interoperability for first aid responses on major disasters, processable without human intervention</b></p>
<p><b>Existing gaps in the State-of-the-Art:</b> The EC explicitly echoed the need for a high-level overall presentation and clarification of relationship between management systems at disaster situations: Risk management, Activity continuity management, etc [ECM13]. From a semantic perspective, there should be an agreement over basic concepts and definitions, which also applies to the EMS sector. A glossary comprising of at least the most important European languages would be strongly appreciated in addition to the vocabulary list of ISO 22300 to facilitate communication. Consequently, it is also needed to map and harmonize the communication symbology (icons, maps, gestures, etc.) not only concerning the existing disjointed items but facilitating to annex new semantics linked to the fast growing of disruptive EMS enablers and other commercial solutions. On the other hand, and beyond semantics needs, it is important to map and facilitate the understanding of the organizational structure of Command and Control EMS-centred by assuming its applicability at major cross-border and cross-hierarchical disaster situations. In this context, it is important to extend ongoing related actions towards highlighting the technological, procedural and collaborative divergences between the matched common requirements (convergences) and those specific for the digitalization of response capabilities. Finally, and bearing in mind the increasing presence of automatisms, communication and operational decisions shall be compliant with capabilities for processing this information without human intervention [OUE19][KER19]. <b>Progress beyond the State-of-the-Art:</b> VALKYRIES will map and review the existing conflicts on organizational semantic and interoperability concerning the actuation of first response aid teams on cross-border disaster scenarios. In this regard, during T2.2 the VALKYRIES terminology and semantics will be agreed under the harmonization of the common requirements (convergences) and key divergences indicated by the committed practitioners and institutions. The results will be adopted through the project working streams, with particular relevance on the opportunities, roadmap definitions and reference integrations for C&amp;C and support to operational decision-making (T5.3), acquisition of Common Operational Picture and warning (T5.4), and cross-sectorial collaboration (civilian protection, volunteering, military (T6.4, T6.5). Since the agreed reference integration aims to build tactical C&amp;C system and services (T7.3), the adopted semantics will be reviewed through the VALKYRIES project development, validations and demonstrations; were the feedback and correction of committed cross-sectorial end-users and external stakeholders will be considered and presented to the interest audience. The target semantics will be adopted at the project engagement in planned/ongoing regulation, standardization and harmonization actions, thus bringing the VALKYRIES vision to the community.</p>
<p><b>Challenge 6. Crowdsourcing the first aid response actuation on disasters, and harmonization of the public alerting systems and processes.</b></p>
<p><b>Existing gaps in the State-of-the-art:</b> Over the past decade, crowdsourcing has become essential to emergency response efforts, as citizens experiencing a crisis often spontaneously share information with the response about current conditions [HAR16]. Beyond conventional disaster crowdsourcing technologies (radio, phone call, etc.), there is growing literature focusing on the potential for digitalized networking paradigms, as is the case of social media. Accordingly, these have the potential to act as a crowdsourcing conduit for early detection, to determine</p>

public sentiment and reaction to response agencies' efforts, to enhance situational awareness, to coordinate among social media users, and to accelerate triage and first aid operational decision making [LAN16]; which interoperability with the existing capabilities (technical, procedural, etc.) demands fast regulatory and harmonization actions. The EU M/487 indicated the EU suffers several lacunae concerning the standardization aspects of alerting when alert management, like the need for client-based applications to or agreeing on a common language for alerting ( aligned with existing ISO/DIS 22322, ISO/DIS 22324, etc.). **Progress beyond the State-of-the-Art:** Various VALKYRIES working streams will advance towards supporting the crowdsourcing as support of the acquisition of a cross-sectorial Common Operational Pictures, among others: Trusted Communication infrastructure and end-user terminals (T4.2), Mobile Command and Control and Operational Coordination technologies (T4.3), Command and Control and support to operational decision-making (T5.3), Common Operational Picture and warning (T5.4), Resource Federation and trusted information sharing (T6.1), or Raising practitioner and social awareness (T6.3). They will reveal technological, procedural and collaborative opportunities, but also the normalization and harmonization gaps to be covered before their adoption by real first aid response teams and related institutions. Among the different working streams, the Alerting and Warning activities will specifically work on the development of a communications network between the involved responders through the exchange of data, messages and/or voice, possibly recording all communications regardless of their origin, location or language, paying particular attention in sending/receiving timely information that support the response team actuation. Some of the related gaps prioritized by the committed end-users will be addressed, and the resulting harmonized capabilities will be reference integrated into SIGRUN.

***Challenge 7. Streamlining the pan-European capacitation for patient-management at first aid responses in mass casualty disaster scenarios.***

**Existing gaps in the State-of-the-Art:** According to [HUG20] the Pan-European EMS community revealed five core challenges concerning first aid respond on massive multi-victim disasters: 1) to identify the situation and deal with uncertainty questions concerning the number of injured or affected people were central in the immediate phase of the mass casualty or disaster events. 2) the need for balancing the mismatch between the disaster contingency plan and reality (public did not behave as the plan presumed or the event developed in an unexpected direction, etc.). 3) To establish a functional crisis organization. In this regard, the M/487 explicitly indicating EU needs for standards on patient-management in mass casualty incidents (e.g., minimal dataset for patient-management, management of data of affected persons in mass casualties, etc.), or to close the gap on (inter)national pre-hospital patient-management with differing national standards. 4) To adapt the medical response to the actual and overall situation. For example, they had to act and provide medical care under threat or in a hostile environment or change the way procedures were carried out. Finally, 5) to ensure a resilient response under the assumption that direct victims are not the only affected, but also health professionals. **Progress beyond the State-of-the-Art:** VALKYRIES assumed by design to research towards enabling faster and more effective responses on mass casualty disaster scenarios, being this one of the main interests of the participant end-users and institutions. Consequently, the Consortium will identify, analyze and create a map of the technological, procedural and collaboration opportunities that may support the Union first aid response teams at such situations. In this context, related capabilities for reconnaissance, triage and crisis response planning (T5.1) and logistics/deployment (T5.2) will be revised; including their enabling equipment (e.g., instrumentation, health support wearable devices, etc. in T4.5) and cross-sectorial coordination (civil protection, and aid volunteerism, etc. in T6.5). Their study will reveal normalization and harmonization gaps, being prioritized at the EU-level capacitation roadmaps to be delivered (D4.3, D5.3, D6.3). The project reference integration (SIGRUN) will be built under the assumption of continuing to the sharing information and facilitate cooperation on cross-border multi-casualty disasters, also delivering more straightforward and more effective education and training tools for first aid intervention on incidents on such scenarios (T7.3). All the project validations, verifications and demonstration will be developed assuming multi-victim situations, resulting in corroborated guidance, recommendations and common requirements for further related efforts.

***Challenge 8. Human-in-the-loop capacitation and provisioning, learning analytics and closing the acceptance gap between first aid EMS practitioners/institutions and disruptive solutions***

**Existing gaps in the State-of-the-Art:** The digitalization of the EU market is embedded with digital transformation strategies that escalate from the technologies involved to their applicability at operational and collaborative tasks, which shall be rapidly provided by the EU industry and accepted to the disaster management practitioners. As reported by the EEB-cPPP concerning their impact on the manufacturing sector[ECT19]: “*AI-based machine learning applications, and further analytics and prediction, together with Big data techniques, are very promising to support decision-making on planning as well as design processes by shortening the processing time while enhancing the expertise and experience of the planners or designers.*” However, the adoption in the context of provisioning first aid related solutions for EMS responses on disaster scenarios is not exempt of multidisciplinary barriers, as is the case of lack of ICT skills, low investment for the combined use of digitalization technologies, social perception of AI as a threat, lack of data, poor adoption of standards, etc. On the other hand, the existing AI enablers shall adapt to the particular difficulties of operating on unfriendly and/or BLOS scenarios, which usually demand to process high-dimensional and heterogeneous data, solving concept drift issues [BAR20], and may derive in need for of energetic feasibility for extending the equipment autonomy when deployed at the Edge. **Progress**



**beyond the State-of-the-Art:** VALKYRIES will prompt the human role on the EU Security Market, assuming all sides of the supply chain, from the developer to the first response teams that are expected to operate supportively by disruptive solutions (T4.4). As part of the scoping analysis to be conducted, all the issues concerning the acceptability in all dimensions (understanding, trust, usability, etc.) of the solutions to be harmonized will be emphasized, among others, towards enhancing the social perception of the introduced changes. On the other hand, priorities, enablers and milestones for their achievement per studying stream (technical/equipment, procedures/operations, collaboration/Education) will be delivered, to derive in pre-standardization actions and prompt related regulatory common requirements. The project will assume explainable, interpretable and trustworthy AI by design, generating datasets and distributing them via the EU Open Data Portal (D2.2), or adapting the analytical outcomes to each user profile (T7.3). On the other hand, VALKYRIES will assume related education and training opportunities (T6.2), like simulations, learning analytics, customized training programmes, etc., towards enhancing the active ageing of the EU workforce and reducing the need for specialized profiles.

**Challenge 9. Explainable and Interpretable Artificial Intelligence at regulatory and harmonisation decisions**

**Existing gaps in the State-of-the-Art:** Combining the output of machine learning models and domain expert knowledge is a well-known and ambitious challenge in the data analytics and machine learning community. The usage of state-of-the-art machine learning methodologies produces black-box models, which reduces the trustworthiness from a user perspective, one of the major barriers when exploiting digital solutions [ECT19]. On the other hand, the AI interpretability 1) helps to ensure impartiality in decision-making, i.e., to detect, and consequently, correct from bias in the training dataset; 2) facilitates the provision of robustness by highlighting potential adversarial perturbations that could change the prediction; and 3) act as an insurance that only meaningful variables infer the output, i.e., guaranteeing that an underlying truthful causality exists in the model reasoning [ADA15]. But despite its relevance, several difficulties, like the lack of research on user-based measures of interpretability, regulation/standardisation or the operational cost of these procedures, have led to Explainable and Interpretable AI being mostly absent from the digitalisation of the pan-European Emergency Response Services (EMS). **Progress beyond the State-of-the-Art:** VALKYRIES will explore and adapt the disruption of state-of-the-art (and beyond) explainable AI trustworthy methods to make the decision-making processes transparent to the pre-standardisation and harmonisation decisions; which are expected to reveal common features to be considered in the normalisation of solutions dependant on machine learning and related AI tools empowering human oversight. These activities will be principally covered by T4.4, which will be transposed to the operational procedures (WP5), and the collaboration and education-related actions (WP6). From a legal perspective to date, a specific assessment of the explainability requirements under art. 22 GDPR concerning the first response to disaster situations is missing. Art. 22 GDPR can offer a baseline for AI explainability to be developed following the High-Level Expert Group on AI, Ethics Guidelines for Trustworthy Artificial Intelligence and the European Group on Ethics in Science and New Technologies' statement on Artificial Intelligence, Robotics and 'Autonomous' Systems. Specifically, VALKYRIES will complement and leverage the notion of Lawful AI, offering a baseline for making the notion operational at a transnational level. Moreover, VALKYRIES will identify systemic accountability measures that contribute to the explainability capabilities specific to the ESM sector.

**Challenge 10. Prompting a pan-European circular economy by raising early awareness on the environmental cross-cutting aspects of green provisioning, normalising and applying harmonised first aid enablers**

**Existing gaps in the State-of-the-Art:** The circular economy (CE) is widely known as a way to implement and achieve sustainability, which is linked to the value chain of the various sectors of the economy strives to ensure circularity, safety, and efficiency [PAU18]. A consistent step towards implementing the CE paradigm and its principles in organisations is that of standardisation. Therefore, from among the various proposals that have been put forward on the normalisation of CE, these approaches of normalisation are shown to lack the full potential of the consideration of CE as a paradigm of sustainability and its incorporation into the concept of excellence of sustainability. This latter characteristic is considered the most evolved concept of quality towards business excellence under the European foundation quality management (EFQM) and Malcolm Baldrige models [ESC19]. In this context, standards provide a source of information and serve as a channel for the transfer of technology for the propagation and distribution of knowledge, which shall embrace environmental, economic and societal value to the future capabilities to be distributed through the pan-European markets and supply chains. Nowadays, there is an essential gap concerning their consideration since regulatory, standardisation and hence harmonisation stages. **Progress beyond the State-of-the-Art:** The Consortium will assume the sustainability (Circular Economies, Energy Efficient, compliant with the environmental protection policies, etc.) in all domains (energy efficiency, engagement in circular economies, socio-ecological aspects, etc.) as essential dimensions on the regulation, harmonization, certification, standardization and exploitation (T2.5, T3.5, T3.6, etc.) of first aid response enablers. To contribute to raise social and institutional awareness, the natural disasters covered by the demonstration scenarios will assume the effects of the climate change at EU disaster resiliency-level, being included in the short, mid and long-term mitigation, preparation response and recovery decisions. The compliance with green developing and provisioning regulations will also be present at certification level (T3.5), exploring how the technological, procedural and collaborative disruptions in the sector may coexist with the global efforts against climate change. These results will also be presented by inferring their economic investment/revenue.



**Challenge 11. Design, production, validation and harmonisation of cyber-physical secure first aid responses strengthened against counterintelligence and free of cognitive bias**

**Existing gaps in the State-of-the-Art:** The rapid proliferation of massive communication and information sharing headed by paradigms like Big Data, triggered new attack surfaced on properties like Communications Security (COMSEC), Information system security (INFOSEC), Operations Security (OPSEC), etc. on which the first responses of the pan-European EMS relies on [AVN19], which adversarial may jeopardize from common practices like the signal, human or open-source intelligence. Given the strong cross-hierarchical, cross-sectorial and cross-border nature of responding major crisis situations, they use to resemble a perfect scenario for counterintelligence operations, when while the response teams are prioritising the fast and accurate fulfilment of their missions less attention is paid to the security of the information that enables their collaboration. Finally, it is worth highlighting the importance of making decisions on suitable information, being addressed by procedures able to mitigate the appearance of cognitive bias. Their presence at disaster management decision-making may derive in critical situations [BRO19], which may be intentionally enforced by counterintelligence actions or unintentional, the latter typically falling into severe ethical issues. These challenges require a greater presence at regulatory/standardisation.

**Progress beyond the State-of-the-Art:** VALKYRIES will analyse and review the potential common requirements to ensure the compliance of the harmonisation solutions regarding self-protection against targeted cyber-physical threats, including those derived from the presence of cognitive bias at the information to be managed or the operational knowledge on which the tactical decisions will be made (T4.2, T4.4); as well as exploring the opportunities concerning technological, procedural and collaborative solutions to audit, hardening and allowing self-protection actuations on the CIS infrastructure in which first aid responders rely on. The audition system shall monitor, register and report potential evidences of physical/logical events and actuations, for which Distributed Ledger Technology-based authentication, authorisation and non-repudiation capabilities shall be implemented to support secure distributed sharing, privacy preservation and exchange of data, models and workflows.

**Challenge 12. Evaluation methodology for assessing the effectiveness of first aid responses by stablishing measurable dependencies with the decisions made during the regulation, standardisation and harmonisation of the capabilities deployed at the operational environment**

**Existing gaps in the State-of-the-Art:** Although disaster risk management is becoming increasingly important in development cooperation, there is still a lack of robust evidence regarding its effectiveness. Few studies based on a counterfactual have been conducted in the fields of disaster management and disaster risk reduction [SAR20], all of them pointing out that knowledge is a key component of resilience. As indicated by the International Federation of Red Cross and Red Crescent Societies [IFR18], to acquire an accurate vision of the effectiveness of the disaster management enables communities to understand and address risks, and to build upon past experiences. In this context, health and economic opportunities are said to be important indicators of baseline resilience [CUT16]. As such, socio-economic status and accessibility to health services are included in specific frameworks. In the context of first response aid actuations this became even more complex, where the difficulties inherent in the affected operational environments, the need for making fast and BLOS decisions, and the dependency of cross/sectorial collaborators difficulties the acquisition of a Common Operational Picture. Hence to assess the effectiveness of the deployed and interconnected harmonised solutions entail a huge challenge that, if adequately addressed, is expected to serve high significance inputs for further regulatory and normalisation actions.

**Progress beyond the State-of-the-Art:** VALKYRIES will explore, design, implement and validate a joint evaluation methodology able to track the effectiveness of the first aid response actuations, while establishing measurable dependencies with the decisions made during the harmonised capabilities deployed at the operational environment (D7.2). This methodology will be based on the fulfillment of operational, functional and operational requirements preliminarily conceived at regulatory stages, thus establishing related Measures of Effectiveness (MOEs), Measures of Performance (MOPs) and Key Performance Parameters (KPPs) or Indicators (KPIs). The methodology will cover from the local validation of the achieved results up to the verification, demonstration and end-user acceptance; being agreed by the committed stakeholders and demonstrated at the VALKYRIES' cross-border demonstrations. The methodology will be designed under direct supervision/agreement of the committed end-user, practitioners, and external stakeholders.

**Challenge 13. Design, gathering, labelling and analysis of datasets for supporting further data-driven solutions**

**Existing gaps in the State-of-the-Art:** The lack of sufficient data illustrating the normal behaviour of cyber-physical systems, biometrics and other health indicators from victims and response personnel, or EMS operations is a major well-known drawback, essential for the training process when using machine learning techniques being fed by associated datasets [MIL15]. This fact underscores the lack of data when abnormal behaviours happen, such as malfunctions or threats from cyberspace and the ones related to a physical safety ecosystem [CHO19]. Acquiring labelled data can be difficult, not only because the labelling process is extremely labour and time-intensive, but also because it can be hard to determine what label to assign due to its inherent uncertainty and the heavy regulatory constraints on its collection and management. Additionally, first responders operating in disaster scenarios are reluctant to expose their systems data, assuming intruders would have more information to misbehave, or that sensitive information of their operations may be leaked. Now, there are no OSINT datasets of cyber-physical information of first aid responses on cross-border scenarios, this gap being critical for the proper training and model-building to be conducted by the VALKYRIES' machine learning-based enablers.

**Progress beyond the State-of-the-Art:** VALKYRIES will address the design, gathering, labelling and analysis of a novel dataset of cybernetic,

biological, behavioural and operational observations cross-border scenarios centred in the actuation of the first aid responses; which will be accompanied by an evaluation methodology and benchmarks for allowing the comparison of the project outcomes with further innovation activities. The resulting dataset will comprise both observations on the real operational environment and simulated/emulated events. At present, there are not exhaustive datasets collected and analysed on related scenarios, so this action entails significant progress beyond the state-of-the-art. On the other hand, although responders may have reference data from physical and behavioural observations, their combination with events observed at the cyber domain is also an existing gap, which will be covered by the dataset to be generated. Its release will be accompanied by an evaluation methodology and a benchmark for allowing further research and innovation. The situations presented in this dataset will be meticulously selected at the end of the project's requirement analysis and engaging a wide variety of stakeholders and the Consortium's experts in heterogeneous knowledge fields. It will be developed and maintained through T7.2 "Datasets Management and Benchmarking," in the scope of being properly released (anonymisation is needed) at the EU Open Data Portal. Compliance of this operation with the ethical-legal framework will be ensured in T1.5 "Ethical and Legal Compliance Framework."

**Challenge 14. Supportive tools for data protection policies when digitalising the pan-European EMS on cross-sector, cross-border and cross-hierarchical disaster scenario.**

**Existing gaps in the State-of-the-Art:** Only in the case of a data breach or in case of exercise of data subjects' rights, the data controller could be considered liable for harms caused by an unfair, unlawful, unproportionate or non-transparent data processing. Hence, an interdisciplinary dialogue is needed to balance individual and collective interests and rights and improve technological innovation while ensuring data protection. This applies to the sector addressed by VALKYRIES. In fact, also emergency responders should balance the potential damage to the individual (and, where appropriate, the public interest in keeping information confidential) against the public interest in sharing information. The aim is to provide a comprehensive approach where the interests of both first responders' and the subjects' that are close to the disaster areas are considered and protected. The introduction of such a new approach is determined by the urgency to fill the gap between law, ethics and new technologies, especially as the first aid response services embrace digitalisation. **Progress beyond the State-of-the-Art:** VALKYRIES will investigate the current data protection legal framework, including relevant soft law and best practices to provide compliant-by-design solutions, which will balance the needs for prevention, detection, mitigation and identification of sources of threats and fundamental rights and freedoms of data subjects (T3.1, T3.2, T3.3). EU reg. 2016/679 provides many different legal bases to process personal data under the circumstances targeted by the proposal, subject to the requirements and conditions for data processing (i.e., collect, share, store data). The proposal offers an in-depth analysis of the typical balancing between confidentiality needs and the public interest in sharing information, as promoted under other EU normative framework as under Reg. EU 2018/1807 on the free flow of non-personal information and Directive EU 2019/1204 establishing access regimes for public data. This provides guidance for technology developers and simple to use test. In addition to the data protection management for the entire project life cycle, VALKYRIES will provide a specific protocol for innovators (tested in 3 of its sub-objectives) and a Data Protection Management Platform (DaMP), a set of online resources and tools for first responders and tool developers, offered in the form of SaaS

#### 1.4.1.1. Innovation Potential

The next table outlines the innovation capacities of VALKYRIES regarding the existing solutions.

Ethics and Regulation	
<b>Existing Products:</b> European and national standards (e.g., ISO and IEC) concerning relevant EU security sectors, i.e., border control, crisis management and CBRNE. <b>VALKYRIES approach and innovation capacity:</b> VALKYRIES will develop innovative standardisation and certification solutions for the crisis management scenarios addressed by the project. Specifically, VALKYRIES will identify existing standardisation gaps and needs, as well as potential solutions to enhance technical, operational and semantic interoperability, based on the existing hard and soft law framework. To this end, VALKYRIES will specifically assess the limits and the opportunities to the achievement of technical interoperability provided by the EU data protection and intellectual property framework	
Pre-standardisation and Standardisation	
<b>Existing Products:</b> European Standards (EN) are the principal product of CEN, CENELEC and ETSI. Developed by a Technical Committee. Existing standards: SEC (2010) 1626 Final, SWD (2012) 169 Final, 2010/418/EU, Euratom, Ares (2013) 1790026, 06/06/2013 - CEN/TS 16595:2013. International Standards provided by ISO (International Organization for Standardization): ISO 22320:2018, ISO 22322:2015, ISO 22324:2015, ISO/TR 22351:2015. Standards provided by OASIS (Organization for the Advancement of Structured Information Standards): Common Alerting Protocol, Emergency Data Exchange Language (EDXL). <b>VALKYRIES approach and innovation capacity:</b> VALKYRIES will determine a roadmap with a pre-standardisation reference model, it	

will identify the standardisation opportunities beyond the work programmes of the European, international and military organisations dedicated to this purpose, developing a sustainable process to improve future standardisation. To develop this task, it will be defined the rationale decision-making paradigm to be developed by VALKYRIES, the APIs and interfaces needed for their internal/external communications, the overarching architecture, traceability of dependencies between components towards achieving a reference integration of the targeted solutions.
<b>Certification</b>
<b>Existing Products:</b> ISO certification (e.g., ISO 22320:2018: Security and resilience – Emergency management – Guide for incident management). <b>VALKYRIES approach and innovation capacity:</b> VALKYRIES will provide a common certification scheme to improve interoperability among the different cross-border, cross-sectorial and cross-hierarchical stakeholders. The certification scheme/s will bring together and enhance existing ones and propose novel solutions to bring up to certification organizations and policymakers.
<b>Harmonisation</b>
<b>Existing Products:</b> EU Mandate M/487 to Establish Security Standards, allocated to CEN/TC 391. <b>VALKYRIES approach and innovation capacity:</b> VALKYRIES will develop a harmonisation framework based on the pre-standardisation map compiling pre-existing standards or proposing modifications to the existing ones and novel developments to fill in the priority gaps. The harmonisation framework will also provide common procedures, guidelines, recommendations and certification scheme/s that will facilitate interoperability among all the actors involved in crisis and disaster management.
<b>Technologies and Equipment</b>
<b>Existing Products:</b> IBM Resilient Incident Response Platform, Raytheon Managed Detection and Response services, RSA NetWitness Suite, Cyber Situational Awareness Package, PARTICLE COP and SAFER, etc. <b>VALKYRIES approach and innovation capacity:</b> The SIGRUN reference integrated platform will interconnect a set of technologies that both separately or as a whole, differ from state of the art solutions because 1) they will be harmonized under the decisions made by the rational decision-making tactics introduced by VALKYRIES; 2) the harmonisations will be conducted for solving regulatory and normalization issues that prevent the adoption of disruptive opportunities, so these capabilities will directly prompt the applicability of promising solutions traditionally underestimated by normalization issues; and 3) the advanced communication, resource federation, C&C and crowdsourcing system in SIGRUN will be adapted towards serving directly needs of the committed end-users and practitioners, which didn't find feasible COTS solutions in the EU nor global markets.
<b>Common Practices and Operational Procedures</b>
<b>Existing Products:</b> Recommendations of scientific and professional societies, specific operational procedures of each emergency services, local, regional and national crisis management plans, international coordination and support plans, EU Civil Protection Mechanism. <b>VALKYRIES approach and innovation capacity:</b> VALKYRIES will provide a global information framework of the common EU operational plans and procedures that will support responders in real-time, making the response to the disaster more effective in all phases. The impact will be even more significant in most extensive or complex disasters or with cross-sectorial or cross-border effects. This increased effectiveness in response will have health, social and economic benefits for EU citizens. On the other hand, it will establish a basic reference from now on for the harmonization of crisis management plans within the EU and will constitute very valuable information for the training and preparation
<b>Cooperation and resource federation</b>
<b>Existing Products:</b> Google Cloud Data Fusion, Microsoft Azure Hybrid Data Integration Service, Oracle Data Integrator, SAP Data Integrator, Informatica, Talend, Adeptia, Astera, etc. <b>VALKYRIES approach and innovation capacity:</b> The innovative potential of VALKYRIES approach to enhance cross-border, cross-sector and cross-hierarchy cooperation and resource federation can be summarized as follows: (1) will propose a vision how to resolve the problem with high fragmentation and lack of standardisation and harmonised certification of the European Emergency Medical Services; (2) will formulate recommendations how to improve cross-sector, cross-border and cross-hierarchy information sharing and management for first aid responses to achieve a Common Operational Picture; (3) will suggest recommendations regarding improving Command and Control (C&C) interoperability as well as inter-organisational cooperation; (4) will formulate recommendations with respect to harmonisation of operational procedures, maintenance, logistics, training and raising social awareness.
<b>Education and Training</b>
<b>Existing Products:</b> Pathgather, EdCast, GoToMeeting, Zoom, and JoinMe, TalentCards, Basecamp, Adobe Captivate 2019, Indra's Cyber Range, etc. <b>VALKYRIES approach and innovation capacity:</b> VALKYRIES will develop an advanced education and training kit, including curricula, education methodology and training materials, for first aid responders. The education and training kit will be tested against multinational, cross-sectorial and cross-hierarchical audience to support the process of interoperability building and capabilities harmonisation for first aid responders in case of disaster situations.
<b>Reference Integration (SIGRUN)</b>
<b>Existing Products:</b> Products like SAFE Identity Trust Framework aims to apply predefined policies, no leveraging the benefits of the AI, as well as proprietary products of first responders not able to provide a cross-border, cross-sectorial and cross-domain vision with harmonising capabilities. <b>VALKYRIES approach and innovation</b>

**capacity:** VALKYRIES will develop a complete technology solution in response to the reference integration (SIGRUN), providing both a trust framework, to support reliable connectivity between diverse assets for supporting first aid EMS actuations, and a fully integrated instrument with technologies capable of deploying a mobile command and control and operational coordination to building a Common Operational Picture (COP) through the situational awareness. VALKYRIES will also leverage health support wearable devices to acquire as much heterogeneous information as possible from the action field.

### 1.4.2. Patent search

A thorough search in patent databases has been conducted, unveiling that although there are several patents with partial relevance to VALKYRIES, they seem not significantly impacting on the project's developments and innovation. For example, this is the case of the following patents:

- “Community emergency request communication system,” US Patent No. 9,414,212. 9 [NOK16]. It introduces a community emergency request communication system that provides a person in crisis with ability to send an emergency alert. Primary and/or secondary responders get the alert and can offer aid to the person in crisis.
- “Self-organizing technology for disaster response and recovery,” U.S. Patent Application No. 16/452,399 [LOW12]. It includes emergency response containers providing both for organisational structure, with a method of assigning roles to available individuals, and task domain knowledge for organisational elements, enabling emergency response and easing effectiveness of external professional emergency response providers.
- “Selection of emergency responders,” U.S. Patent Application No. 14/788,580 [BRU15]. This patent introduces a novel approach for determining, at the server-side, one or more emergency response operations to be performed based on the emergency response request.

**To the best of the VALKYRIES Consortium knowledge, there are no patents with a significant impact on the development/innovation proposed in the project. None of them applies in the methodology to be introduced nor in the first aid response solutions target of potential harmonisations. The inclusion of some of them will be completely optional and under a full agreement with the committed end-users.** Consequently, the VALKYRIES' results fit well to be reported in the standardisation bodies and related patenting actions.



## 2. IMPACT

### 2.1. Expected impacts

#### 2.1.1. Contributions towards the expected impacts of the Work Programme

Medium term
<p><b>Call Expected Impact:</b> <i>“Standards for an effective deployment of resources to respond to major crisis.”</i></p> <p><b>VALKYRIES contributions:</b> VALKYRIES will conduct a deep review of the growing opportunities (technologies, procedures, collaboration, and training) for enhancing first aid response on multi-casualty disaster situations (OBJ-1), analysing them and reviewing a map of this landscape and a suggested EU-level roadmap for their adoption. Based on them, VALKYRIES will analyse the related ethical, regulatory (OBJ-2), standardization (OBJ-3), certification (OBJ-4) and harmonization challenges and needs (OBJ-5), aligning them with the capabilities roadmap and designing an adapted harmonization strategy able to fast and sustainable support their normalization (emphasizing future thinking, closing the digitalization gaps on the personnel, assuming their provisioning on circular economies, etc.). In agreement with the committed end-users and institutions, a set of opportunities will be selected for harmonization and reference integrated by applying the proposed method (OBJ-6), resulting in guidelines, field notes, lessons learned for guiding further actions; but also returning harmonized solutions adaptable by the EU disaster teams. These harmonisations will emphasize cross-sectorial cooperation with civilian protection, volunteering actions, military assistance, etc. (OBJ-7). The result will be SIGRUN, a reference integrated platform (OBJ-8) on which validations, evaluation and demonstration on large scale cross-border scenarios will be conducted (OBJ-9). As explicitly indicated in the highlights of the project Standardization Strategy (Section 2.2.2, full version to be delivered at D2.5), VALKYRIES partners attempt to get directly or indirectly involved in different working groups of regulatory standardization bodies/initiatives, so project's results are directly contributed to the relevant normalization activity by the involved team member (OBJ-2, OBJ-3). It is expected that the project visions, lessons learned and recommendations improve further EU related standardization actions. On the other hand, it is likely that the study conducted and reference harmonization lead to initiate needed pre-standardization actions or contributing to planned/ongoing actions.</p> <p><b>VALKYRIES results:</b> Deliverable D2.4 will present the acquired map of standards and suggested roadmap for EU-level joint-related normalization actions, including pre-standardizations and standardization. D2.2. will give harmonized semantics and a joint terminology able to assist cross-sector, cross-border and cross-hierarchical normalizations. D2.5 will deliver a rational harmonization and standardization strategy, able to adapt to the disruptive nature of the growing ecosystem of opportunities. D2.6 will periodically report the participation of VALKYRIES in related pre-standardization and standardization actions. As support for further standardizations, D4.1, D5.1 and D6.1 will present the maps of technological, procedural and collaborative opportunities for enhancing the EU first responder capabilities. D4.2, D5.2 and D5.3 will give the standardization opportunities on them. D4.3, D5.3 and D6.3 will propose EU-level roadmaps for their standardization.</p> <p><b>Means to impact assess:</b> Several perspectives will assess the impact of VALKYRIES on standardizations: 1) quality of the support achieved from committed parties on standardization actions (# of consultations asked in pursuing OBJs, # stakeholders involved in each workshop, # local/EU related standardisation committees in which VALKYRIES contributed, etc.); 2) quality of the generated supportive material (acceptance of the deduced maps [0...10], # realistic operation tests, etc.); and direct performance on standardization activities (# pre-standardisation related opportunities identified, # ongoing/planned standardization actions in which contributes, # Novel standardisation actions initiated, etc.).</p>

#### 2.1.2. Contributions to enhance business opportunities and innovation capacity

According to recent market research overviews, the global pre-Covid-19 incident and emergency management market size expected to grow from USD 114.8 billion in 2020 to USD 156.9 billion by 2025, at a Compound Annual Growth Rate (CAGR) of 6.4% and post Covid-19 incident and emergency management market size expected to grow from USD 117.2 billion in 2020 to USD 156.1 billion by 2025, at a CAGR of 5.9% during the forecast period [MAM20]. The increasing natural, human-made or pandemic emergencies are motivating the growth of this market, especially regarding the technological advancement in tools, devices and first aids vehicles used for disaster management, including enhanced communication and data exchange systems. This is particularly relevant in cross-sector and cross-border scenarios, as the ones targeted in VALKYRIES, as they have been rarely explored and investigated and need evident attention at the EU level, as indicated in the final report of the last European Civil Protection Forum, 2018 [ECR18]. This report is identifying four main pillars: 1) Strengthening preparedness: enhancing Europe's collective capacity to respond; 2) Simplifying response: every second count; 3) Scaling up prevention: small actions, significant

changes; and 4) Fostering resilience: working with Europe's neighbourhood. And all of them are including references to the work that needs to be done at the EU level to improve this cross-collaboration between different actors from different locations and countries, especially those in the neighbourhood.

In this context, the VALKYRIES project is including development and demonstration phases for innovative solutions that will unwrap valuable opportunities aimed at providing the expected compatibility between existing and emerging technologies in the field of emergency response and civil protection. In this way, current standards, procedures, and regulations will be upgraded and harmonised to ensure security and safety during the achievement of critical situations. Existing models for early warning systems and incident response services can be further developed and upgraded by adapting those to the VALKYRIES technological solutions. It will have an important impact on the compatibility of communication protocols for data transfers in emergencies.

VALKYRIES will also bring a roadmap of expertise landscaping and actual trends in the employment of advanced technologies, procedures and tactics. Through the four proposed use cases, a mapping of test capabilities and protocols in the EU member states will be delivered for further capitalisation of knowledge and technological solutions. The results of VALKYRIES in terms of harmonisation and standardisation will align the innovation efforts of European companies and make them more useful. And the dissemination of those results will also have a scientific, professional, social, and political impact that will also arouse the interest of potential new industrial and financial partners with interest in the incident and emergency management market.

For the reasons stated above, VALKYRIES represents a business opportunity not only for the industrial partners and SMEs of the Consortium, but in general for the EU private sector that develops related activities such as:

- Vehicles, equipment and supplies for emergency services. Advances in the standardization of requirements will allow higher effectiveness of the research and development efforts of these companies. The integration capability will provide business opportunities for smaller companies.
- Companies and educational institutions for first responders and rescuers. Advances in the harmonisation of procedures and aspects of accreditation and training of first responder teams will give new opportunities to educational institutions with programs related to emergencies and disasters.
- Medical technology companies. VALKYRIES will guide new opportunities in wearables, telemedicine, wearable therapy devices, etc.
- Software solutions companies. The development of detection and early warning systems, emergency support, alert to populations, integration and communication management, and command and control assistance will be supported. Integrability will also provide new opportunities for SMEs in this sector.

Telecommunications companies. Along with new opportunities for emerging technologies such as 5G and Beyond 5G, the results of VALKYRIES will lay the foundations for a true revolution in communications and data transmission in response to emergencies and disasters.

### **2.1.3. Benefits to the society**

The results of the VALKYRIES project will have a positive impact on society at large. First, VALKYRIES will increase EU overall resilience and effectiveness in cross-border disasters with multiple victims by enhancing transnational and cross-sectorial trust among different players and in their interaction with data-driven technologies (e.g., the ones based on AI algorithms). The project's harmonisation activities will thus improve efficiency and interoperability in the intervention and coordination of first aid responders in European multi-victim disasters, contributing to lay down a transnational pan-European approach to react to disasters, where to place certain mass notification of the disaster scenario to the society and potential operational instructions to follow, meeting points, evacuation routes, etc. Secondly, the development of a holistic framework to support the standardisation and harmonisation of cross-border first aid response will enable disruptive technological innovations, their early testing while fully protecting individual and collective rights and interests under the relevant ethical-legal framework. The clarity in the legal and ethical framework will offer a fertile ground for quick uptake of VALKYRIES solutions by both industry and society at large. Legal compliance, along with appropriate consideration of relevant ethical and societal aspects, will ensure social acceptance of the solutions produced by the project. Finally, VALKYRIES will enhance the capability of the EU market and R&D initiatives to bring about harmonised mitigation, preparedness, response and recovery improvements in disaster management. Creating EU-wide standards in this sector will ultimately help reduce the EU Security market fragmentation, contributing to an actual internal market for security and fostering the competitiveness of the overall Security European Industry.

## 2.1.4. Barriers and obstacles to achieve expected impacts

To realise the potential market impact outlined in the previous sections, the project may face several barriers and obstacles that may affect its actual impact. In the following are summarised some of them, as well as the identified contingency measures. Due to page limits, we do not provide an exhaustive list of all possible risks but rather focus on the most critical ones. It is important to highlight that while the VALKYRIES impacts are grounded and clearly tangible, the Consortium cannot control all external factors and barriers that may affect and possibly hinder these impacts. Such potential barriers are broader than the risks identified in Section 3.1.4.1 (Risk Management) and will be monitored continuously during the project, with the actions proposed. The combined efforts of T1.1 and T1.5 will ensure any relevant risk is considered and addressed.

<p><b>BAR-1: Lack of trust to share threat &amp; vulnerability information between private and public sectors</b></p> <p>VALKYRIES pursues as one of its main objectives the standardization and harmonization of the systems on which the infrastructure of the different first responders spread across Europe is based. Therefore, the development of collaborative platforms to facilitate the exchange of information between stakeholders plays a key role in the pursuit of an aligned, connected and prepared EU for cross-border disasters. However, the lack of trust between different public and private actors in each country is seen as the primary inhibitor to cross-sectorial and cross-border collaboration, and intense competition and distrust from business rivals often prevent information exchange and cooperation between different private sector stakeholders [BRO18]. Companies and organizations are hesitant to share information with stakeholders because of their law enforcement and supervisory functions, as well as fear of sanctions under national laws or competition. In contrast, fear of adverse media coverage is another reason why organizations are reluctant to expose operational information to the public sector and the general public.</p> <p><b>VALKYRIES' measures:</b> The Consortium is aware of the need for a deeper level of integration between the EU First Responders, and the corporations, both private and public, that present themselves as actors responsible for offering solutions to facilitate the integration mentioned above (communication platform providers, identification wearables, network coverage in grey points, etc.). This set of stakeholders is correctly represented in the VALKYRIES Consortium. With this in mind, VALKYRIES aims to carry out the task of strengthening public-private partnerships both within the Consortium, from the beginning and throughout the project duration, and outside it to define the needs of the main stakeholders and identify the large ecosystem of emerging opportunities offered by new technologies to improve the performance of first responders in disaster situations. These actions are specifically present in tasks like T3.2, T3.3, and T4.2.</p>
<p><b>BAR-2: Country-specific &amp; cultural differences affecting regional uptake of VALKYRIES</b></p> <p>Notions of privacy, security and safety depend mainly on context and legislation and differ between cultures and countries, even within Europe. Therefore, questions such as infrastructure, security, policy on the transmission of data and sensitive information, awareness and education are not only technical but also, in no small extent, socio-economic and political. The VALKYRIES' Consortium identified that the policies for information exchange, the management of certain types of sensitive data, as well as the systems, equipment and protocols used in emergencies and disasters by the different actors vary widely among the EU Member States. Each of them has national strategies that are also marked by cultural and political preferences. Such preferences and differences could generally hinder the adoption of VALKYRIES at the EU level; or they may significantly limit the capabilities of some of its functional components.</p> <p><b>VALKYRIES' measures:</b> One of Europe's differences from the global situation is that the EU institutions vigorously pursue the above challenges, at least at the macro-regional level. With this in mind, the VALKYRIES' Consortium will leverage, despite the intra-community differences, the rich diversity of its members (public and private) to study the differences in the ecosystems of health emergencies and disasters (legal, ethical, social and technological) and investigate new tools and disruptive solutions that can be applied in this field to achieve a standardization of protocols, information collection systems and the creation of gateways for the transmission and centralization of information for field decision-making and patient tracing. Through tasks T1.4, T1.5, the Consortium aims to positively influence the EU-wide promotion of the solution pursued in VALKYRIES.</p>
<p><b>BAR-3: Lack of European/international agreements, standardization and regulations on data management</b></p> <p>As explicitly reflected in the EU Mandate M/487, standardisation in crisis management faces obstacles due to the lack of interoperability at all levels (semantic, organisational, resilience, planning and technological) between the different First Responder organisations in the EU. As an additional barrier, we find national standards that "seem to pose a major obstacle for the creation of a true internal market for security, thus hindering the competitiveness of the EU industry" [ECM13]. Standardisation and certification at EU level could considerably support companies to enter the international market and therefore gain more visibility, which should be in line with the ongoing standardisation of cross-cutting digitisation enablers such as AI, intelligent use of Social Media, unmanned vehicles with autonomous driving capabilities, cloud computing or 5G.</p> <p><b>VALKYRIES' measures:</b> As defined in the WBS, the VALKYRIES Consortium's main expected impact is to contribute to the standardisation, regulation and harmonisation of first aid response solutions for disaster management and civil protection. All the standards assumed in the design stages of the project will be monitored throughout the project life cycle in search of modifications or discards that may affect the expected results of the project. Consequently, the challenge for VALKYRIES lies in the development of specific</p>

standards for the improvement of the comprehensive interoperability of European First Responders, under the established ethical-legal guidelines. Besides, it will closely follow all regulatory and standardisation developments related to this subject within European Standardisation Organisations (ESOs), i.e., CEN and ETSI, and promote their impact outside the Union.

#### **BAR-4: Lack of ICT skills and short-term learning strategies**

Although the First Responder sector has a very positive social impact, it is experiencing an ageing workforce, reluctant to change and with very limited experience in the use of ICT devices and tools, technologies that, on the other hand, are creating jobs never seen before and demand specialised personnel familiar with the new technology enablers. As noted in [ECS17], this context will change in the coming years, as “the proportion of low-skilled workers declined between 2008 and 2015 in almost all countries,” and the ageing workforce has been replaced by a new generation of the native digital workforce. The further information and communication technologies require short-term learning tactics capable of dynamically adapting the current workforce to the disruption of paradigms such as AI, advanced simulation environments, assistance drones (network, vision, transport), unmanned vehicles, etc. **VALKYRIES’ measures:** The VALKYRIES project will directly assume the activities related to research on the use of new technologies in the EMS sector and will promote their application (WP4 “Equipment and ICT enablers for First Aid Responses”). In parallel, it will train the workforce both in these technologies and in intra-sectorial and cross-border cooperation (WP6, Cooperation, Education and Training for First Aid Responses) and raise awareness of the importance of a standardised protocol for emergencies involving several EU countries.

#### **BAR-5: Inadequate levels and focus of investment in R&D on digitalization technologies**

The availability of the necessary funding and equipment is a challenge for the implementation of research and development digitisation practices in the Civil Protection sector. Despite its potential economic benefits as a result of its contribution to reducing operational costs and preventing accidents and security breaches, companies and institutions are allocating an insufficient budget. Investment in these applications is lower than in other sectors, so support from the public and private organizations is essential [EPC13]. This is directly associated with the lack of awareness of the need for standardization and the use of new technological paradigms in the management of health emergencies among board members, who are responsible for resource allocation decisions, but also due to the lack of knowledge about them. Note that the lack of investment and available funding is of particular concern, especially for SMEs, even though many small and medium-sized enterprises are linked to larger ones through their supply chains [EPC19]. **VALKYRIES’ measures:** The research carried out at VALKYRIES will be accessible to first responders and companies in the Civil Protection ecosystem, so the information on the needs set out in Mandate M/487 and the opportunities provided by new technologies will reach all stakeholders. A side objective of VALKYRIES is to encourage investment in new technologies in civil crisis management in a consortium in which SMEs and First Responders from the EU are particularly present, and to provide estimates of investment costs and the outcome of their adoption through demonstration scenarios, thus revealing the knowledge needed to drive, support, justify and recommend funding measures. The Consortium will deliver related information and business cases as a result of task T3.6, “Sustainable exploitation and commercial deployment.”

#### **BAR-6: Insufficient datasets and supportive data-driven enablers**

The lack of available data and the inadequate capacity to share it among stakeholders will be a significant obstacle to the integration of AI in the Civil Protection sector [ARS17]. While new technological enablers such as edge computing, 5G, Big Data facilitate their collection and management, a mechanism/platform –or a gateway integrating existing systems– is needed to facilitate the exchange of data between stakeholders, as well as the management of information ownership, its evaluation and the avoidance of privacy and data protection issues. In the Civil Protection sector, this is particularly relevant as the nature of the information processed is highly sensitive. **VALKYRIES’ measures:** Echoing this need, the EU, through European Standards Organisations (ESO), encourages initiatives for standardisation at all levels that would result in improved interoperability, with specific reference to “communication interoperability between command and control centres, as enablers of coordination and cooperation efficiency.” It is within the scope of the VALKYRIES project to cooperate with this initiative by producing and sharing standards for data transmission with both synthetic operations and real demonstration scenarios specifically defined in tasks 7.5-7.8.

#### **BAR-7: Social perception of digitalization and AI as threats**

Digitization and its AI-related applications are imposing a transformation in the management of civil crises (victim tracking, communication with the population, drones, etc.). Although the digital transformation is bringing proven advantages in terms of sustainability, efficiency, quality and performance, it can be perceived by society as a threat [ECT19]. From the workforce standpoint, the main concern is technological barriers and the risk of job loss, but citizens’ point of view, one of the main problems will be the lack of privacy and the risk of continuous surveillance. There is a cross-sectorial resistance to change. Other barriers to social acceptance stem from the emergence of security problems attributed to AI-related processes, which can range from the handling of sensitive information to the presence of cognitive biases in decision stages [ECG19]. Fostering trust and awareness are the keywords that VALKYRIES will promote to turn threats into opportunities. **The VALKYRIES’ measures:** The VALKYRIES project will assume security and privacy by design, as suggested in the EU Ethical Guidelines for Trustworthy AI [ECG19], which will be established in T3.3 and T6.1. The impact and exploitable results of the project will be



translated into new business models in task T3.6, which will review in detail the social uptake of the introduced technologies, including potential suppression of jobs or staff qualification needs. To mitigate cognitive bias in learning automatisms and procedures, WP4 “Equipment and ICT enablers for First Aid Responses” will embrace the explainable AI paradigm, which will be supported by adaptive tactics to be developed mainly in task T4.4. This will lead to reaction procedures against misuses or misconfigurations of the digitised technologies.

#### COVID-19 Crisis Management

This proposal was finalised during the Covid-19 crisis. Still, most of the plans (even the targeted call) were made before the extent of the crisis was known, accordingly adapted, and may be extended to a post-Coronavirus context (under the expectation of further National level and European decisions). This is particularly relevant considering that **most of the VALKYRIES stakeholders and practitioners are related with the pan-European forces that right now are bravely fighting for ensuring the health of the Union citizens and that our health services do not collapse (Emergency Medical Services, Civilian Protection, Firefighters, Law Enforcement Agencies, Military Emergency Services, etc.); some of them actual partners of the VALKYRIES Consortium (SMS, ISEMI, BRC, HESE, ATA, AREU).** Consequently, the Consortium is prepared to re-plan as needed to handle the effects of Covid-19 mitigation measures, and in particular making new plans due to cancelled events, which also may impact on the *in situ* General Assembly meetings, events with the External Advisory Board and other external stakeholders; the worst case may disrupt on the demonstration scenarios. The Consortium will look for possible ways to improve the online presence of the project for its proper development but also dissemination and engagement in ongoing/planned regulatory, standardization and harmonization actions. It is possible to anticipate that some dissemination targets will need to be adjusted. That project presentation material has to be adapted to online formats, for example with more videos of demos and presentations, and new online material like ‘video pills’ or webinars. It is, therefore, unavoidable that the communication and dissemination plan for the project will be affected and, in some instances, delayed. A priori this is not expecting to affect the base work of the Consortium, since internal meetings and related events can be telematically addressed. However, it shall be considered that if the criticality of the pandemic rebounds (or the pandemic itself) get worse, this may temporally affect the committed Emergency Services, causing potential delays on the project timings. **As the Covid-19 situation evolves, the Consortium will look for possible ways to improve the online presence of VALKYRIES and ensure the safety of the participants, without disrupting the daily activities of all the committed parties (in particular, emergency responders). As a response to the risks derived from The Covid-19 pandemic, at early T1.1, a Covid-19 actuation protocol will be agreed and delivered (D1.8). This protocol will be updated as the project evolves, describing and reporting the effectiveness of the contingencies applied while serving as reference for further related projects.**

## 2.2. Measures to maximise impact

The dissemination and exploitation of the results of this project will be conditioned by the characteristics of the application domain in which the technologies, methodologies and training materials developed in the project will be applied. Communications to each of the target audience groups will, therefore, be tailored. These actions will follow a clear strategy and action plan with three phases, naturally linked to the cycles defined (Section **¡Error! No se encuentra el origen de la referencia.!**):

**Awareness building phase** (doing the project known): During this phase, the awareness of the target audiences that have been described about the solutions offered by the VALKYRIES project to improve the response to disasters will be promoted. Its implementation will be boosted by the different emergency services, and research and innovation in this field of technology will be encouraged. **Participation phase** (targeting defined user groups): In this phase, the audiences will learn about the tools and applications developed on existing standards and regulations. The results will be disseminated through specific dissemination channels for the different defined audiences: scientific publications, conferences and events, including trade shows and exhibitions, as well as through the creation of specific working groups. **Action phase** (influencing practices, products and standards). This phase will include events with end-users, gathering news requirements for VALKYRIES use case, etc. At the end of the project, several use cases will develop that will allow the results of the project to be known and evaluate by the end-users. In this way, the project will provide feedback, which will allow the inclusion of alternative approaches, new standards as well as improvements and its implementation. End-user partners and Government/Regulatory Agencies will focus their dissemination activities on targeting the international end-user community, as well as other private and public institutions and bodies in Europe related to the topic; Certification and Testing Laboratories will focus on maximizing the impact on certification and accreditation related actors; Military institutions will raise awareness on the pan-European defence communities; RTOs and University partners will focus on targeting academics, the research community, and other (related) research activities/projects and industrial partners will focus on targeting the industry.

## 2.2.1. Dissemination and exploitation of VALKYRIES results

VALKYRIES will implement an integrated plan for effective dissemination and exploitation of results which focus on pre-standardization, standardization and harmonization related activities. Although the dissemination plan will be delivered as an outcome of task T1.4 *Dissemination strategy*, it will consider three main objectives: i) create widespread awareness of the VALKYRIES solution and other project results among target audiences; ii) stimulate discussions and engagement with the pan-European and international Industry, Research and Technology Organisations (RTO), Certification and Testing Laboratories, Government/Regulatory Agencies, Military and General Public interested in the development and applicability of VALKYRIES and other results; iii) motivate target audiences to deploy VALKYRIES and other results commercially, and for further research and innovation. The table below presents the preliminarily identified audiences, Consortium interest, and contents/channel.

Audience	Main Objectives	Contents	Dissemination Channel
<b>Industry, including associations and clusters</b>	Raise awareness; generate interest; increase readiness to engage commercially; motivate their participation at regulatory and harmonization actions	Leaflets, newsletters, project presentations, posters, demos.	Trade shows, VALKYRIES workshops, conferences and exhibitions, public events, website, Social Media.
<b>Certification and Testing Laboratories</b>	Raise awareness; generate interest; increase readiness to adoption; motivate their participation at regulatory and harmonization actions	Leaflets, scientific papers, project presentations, posters, newsletters, demos	Private and public forums/events attended by cyber-defence practitioners, VALKYRIES workshops, project demonstrations, website, Social Media.
<b>Regulation and Standardization</b>	Raise awareness; generate interest; increase readiness to adoption; prompt related standardization, pre-standardization and harmonization actions; consider the VALKYRIES vision at cross-cutting standardization groups; motivate their participation at regulatory and harmonization actions	Leaflets, scientific papers, project presentations, posters, newsletters, demos	Private and public forums/events attended by cyber-defence practitioners, VALKYRIES workshops, project demonstrations, website, Social Media.
<b>End-users and disaster response practitioners</b>	Raise awareness; generate interest; increase support for VALKYRIES; increase readiness for adoption and commercial engage; motivate their participation at regulatory and harmonization actions	Leaflets, newsletters, project presentations, posters, demos	Private and public forums/events attended by cyber-defence practitioners, VALKYRIES workshops, project demonstrations, website, Social Media.
<b>Military</b>	Raise awareness; generate interest; increase support for VALKYRIES; motivate their participation at regulatory and harmonization actions	Project presentations, newsletters, demos.	Project demonstrations, VALKYRIES workshops, website, Social Media.
<b>Private and public institutions/agencies in Europe</b>	Raise awareness; generate interest; increase support for VALKYRIES; motivate their participation at regulatory and harmonization actions	Project presentations, newsletters, demos.	Project demonstrations, VALKYRIES workshops, website, Social Media.
<b>Research and Technology Organisations (RTO). Academy</b>	Raise awareness; generate interest; increase readiness; to engage in further; research based on VALKYRIES results; motivate their participation at regulatory and harmonization actions	Scientific papers and conferences, posters, reports, guidelines, protocols, project presentations, lectureships and academic symposiums.	Journals, workshops, conferences, website, Social Media.
<b>Other related European projects and initiatives</b>	Raising awareness; invitation to collaborate; presentation of results.	Leaflets, scientific papers, project presentations, posters, newsletters, demos.	Email, webinars, meetings, website, Social Media.
<b>General public</b>	Raising awareness; Obtaining support.	Basic project information, press release.	Website, Social Media.
<b>Media</b>	Raising awareness; Obtaining support.	Press release.	Email, website, socialmedia.

### 2.2.1.1. Dissemination plan

The dissemination plan will require the review of local information, identification of stakeholders that enable the further development of the solutions, identification of funding sources and establishment of common requirements and replication strategies. The exploitation of the VALKYRIES results will vary significantly depending on the partner group. Practitioner partners will mainly benefit from having access to non-vendor specific, low to zero cost, tools and applications. Industrial partners will benefit from selling services (customisation, support, maintenance) to practitioners, and leveraging the results of VALKYRIES in a new generation of existing products and services. RTOs will mainly benefit from the project results by leveraging the knowledge, technologies and collaboration with end-users in future R&D&I. Individual overview of main exploitation plans per partner has been outlined in Section 4. The table below summarises the dissemination interests of partners with greater effort in this task.

End-users
<b>SMS</b> will present the project's results through devoted papers or posters, to disseminate VALKYRIES among the international community of first responders to emergency situations. Attendance to Conferences such as NCT NCBNE Europe ( <a href="http://nct-europe.com/">http://nct-europe.com/</a> ) or FIRST Conference ( <a href="https://www.first.org/conference/2019/">https://www.first.org/conference/2019/</a> ) will contribute to disseminating the project results at an international level; which will be combined with local related events and showcases.
<b>BRC</b> will disseminate the results of VALKYRIES in its website and social media, as well as through its bi-weekly electronic bulletin, distributed to various media and stakeholders in Bulgaria. Specifically, the project results will be communicated with the National Civil Protection authority in Bulgaria (DG "Fire Safety and Protection of Population") and with the NATO Centre of Excellence in Bulgaria. Internationally, the BRC will disseminate the project results within the Red Cross Red Crescent Movement, specifically among EU National Societies through the Red Cross Office in Brussels (at EU level events) and in the wider Europe region through the Regional Office of the International Federation of the Red Cross Red Crescent Societies in Budapest. Depending on the nature of project outcomes and their potential end-users, the project results may be disseminated in other international platforms and networks in which the BRC is a member or has cooperation with. These possibilities include the International Commission for Alpine Rescue (ICAR), International Life Saving Federation of Europe (ILSE), Disaster Preparedness and Prevention Initiative for South-Eastern Europe (DPPI SEE), etc.
<b>HESE</b> will disseminate the VALKYRIES results in relevant conferences and workshops, targeting the relevant VALKYRIES research areas related to the role of healthcare institutions in cross-border emergency response, including cooperation and information exchange. HESE will disseminate the results to Portuguese stakeholders directly involved in healthcare, security, safety and civil protection aspects. HESE will collaborate in the update of the content of the project's official website.
<b>AREU</b> will disseminate the VALKYRIES results to Italian (particularly Lombardy) stakeholders involved in the healthcare and emergency response. This target will be reached with communication in relevant congress, conference, workshop and with publication in scientific literature as permitted. All the communication will be directed to people involved at a different level in healthcare, cooperation and emergency response
Industry/SMEs
<b>IND</b> will disseminate VALKYRIES results in the trade fairs and relevant industrial/research conferences and committees it attends regularly. In the scientific domain, IND will participate in national, European and international congresses and conferences, workshops and seminars, forums and exhibitions, research journals and technical reports. On the other hand, in the area of establishing relationships with industrial stakeholders, research centres and academy, IND will promote the organisation of industrial workshops, seminars, as well as participation in lectures and master's courses to disseminate the results, identify new talent and generate innovation opportunities. Finally, IND also expects to participate in industrial forums more focused on security techniques and methodologies on cyber defence and transport, carrying out demonstrations and technical workshops about the results obtained during the project.
<b>TAS</b> will direct its dissemination strategy of VALKYRIES towards its two usual areas of influence in Spain, Central America, South America, seeking to reach those interest groups that can benefit or take advantage of its direct or future results: 1) Emergency services and professionals (especially doctors, nurses and emergency medical technicians). 2) Learning institutions (universities, colleges, training centres, etc.). To achieve this, TAS will use, among others, the following channels and events: A) Seminars and conferences: both online and in-person, for communication of the project and its results. B) Congresses: presentation of the project results in national and international professional meetings related to emergencies. C) Training actions: the study of the project and its results will be included in all the training programs of TAS related to emergencies or disasters. D) Corporate website and social networks: TAS' website and institutional profiles on Facebook, Twitter, Instagram and LinkedIn will be used to disseminate VALKYRIES to a wider audience.

<p><b>PARTICLE</b> aims to disseminate the VALKYRIES results and project achievements through the publication of at least 1 article in a security-related magazine. Also, PARTICLE plans the participation in 2 IoT, Health and Security-related events (exhibitions, fairs, workshops, meetings), involving an audience of more than 100 participants. Besides, PARTICLE will support cross-fertilisation and networking activities between the VALKYRIES Project and relevant initiatives in the emergency field (e.g., Segurex in Portugal, Milipol in France). PARTICLE will contribute to the VALKYRIES project's website and social media platforms and will promote them to PARTICLE's contact network. Finally, PARTICLE will produce at least three blog entries associated with the VALKYRIES Project that will be published on the company's official website and social media pages.</p>
<p><b>NOVOTEC</b> will disseminate WALKYRIES results in the trade fairs and relevant industrial/research conferences and committees it attends regularly. In the scientific domain, NOVOTEC will participate in national, European and international congresses and conferences, workshops and seminars, forums and exhibitions, research journals and technical reports. On the other hand, in the area of establishing relationships with industrial stakeholders, research centres and academy, NOVOTEC will promote the organisation of industrial workshops, seminars, as well as participation in lectures and master's courses to disseminate the results, identify new talent and generate innovation opportunities. Finally, NOVOTEC also expects to participate in industrial forums more focused on security techniques and methodologies on chemical, energetic and oil sectors carrying out demonstrations and technical workshops about the results obtained during the project.</p>
<p style="text-align: center;"><b>RTOs</b></p>
<p><b>UMU</b> plans to disseminate the results obtained in VALKYRIES publishing them in venues with high scientific levels such as top journals and conferences. They will also be disseminated with local stakeholders with which UMU has a collaborative relationship regarding the transfer of research results from the University to private companies.</p>
<p><b>SSA</b> will include VALKYRIES outputs and methodologies in training activities and classes addressed to professionals and stakeholders, as well as courses and seminars addressed to undergraduates and PhD programs both in Law and Data Science. The developed protocols and guidelines will be adapted to other sectors for further technology transfer. SSA will disseminate the VALKYRIES output to a broader academic and professional audience with a workshop dedicated to the ethical, legal and societal aspects (ELSA) addressed in the project. SSA will also reach out to the broader public through periodic press releases and social media posts describing the progress of the project.</p>
<p><b>BDI:</b> Professors and researchers in BDI are committed to develop and publish in peer-reviewed journals in the fields of Defence and Security Policy, Human Factors in defence and security, Cloud, IoT, Artificial Intelligence, and in general in ICT. Besides, BDI will use the Defence Science and Technology Journal (JDST), which is edited and published by the Institute to disseminate projects' results. Finally, BDI is going to communicate VALKYRIES results via yearly organised Military Technology &amp; Science conference, by-annual HEMUS conference, publications in scientific journals, NATO Science and Technology Organisation and the European Defence Agency conferences and workshops, International Scientific yearly Conference Digital Transformation, Cyber Security and Resilience, etc.</p>
<p><b>KEM</b> as the scientific, consulting and research agency for the Hellenic Ministry of Citizen Protection will bring and promote the scope, goals, objectives, and results of VALKYRIES project to the attention of the Hellenic Ministry of Citizen Protection and the first responder's organizations supervised by the Ministry of Citizen Protection as well as other relevant Ministries and authorities. The outcomes of the project will be promoted to the organizations that KEM is currently a member, as well as to other stakeholders, including policymakers and First responders organizations, during the one-day events, workshops and table-top exercises that are organized by KEM.</p>
<p><b>USN</b> offers a wide range of studies in both humanities, natural science and technology with a clear focus on technology for maritime operations., having direct cooperation with maritime authorities nationally as well as international, the first having laboratories and training centre locally The dissemination actions of USN will focus on sharing knowledge and teach relevant personal, assuming as typical target groups organizations and agencies involved in rescue and cleaning up operations on the sea. USN will teach courses at the university, both as a part of our running MSc and BSc activities and supplementary courses.</p>

To disseminate the VALKYRIES results to the defined target audiences, the VALKYRIES dissemination actions will take advantage of a mix of channels best suited to each audience, including publications and events:

**Scientific publications:** VALKYRIES partners will select the most appropriate journals and conferences to disseminate the results achieved. The Table below provides an initial selection of targeted publications.

Publication	Main dissemination aspects
<b>IEEE Communications Surveys and Tutorials</b>	JCR IF: 20.2 (Q1). Disseminates tutorials and surveys covering all aspects of the communications field, with the purpose of adding understanding to the existing literature on communications, putting results in context.



<b>IEEE Transactions on Dependable and Secure Computing</b>	JCR IF: 6.404 (Q1). Dependability and security, including the joint consideration of these issues and their interplay with system performance.
<b>International Journal of Disaster Risk Reduction</b>	JCR IF: 2.896 (Q2). Fundamental and applied research, critical reviews, policy papers and case studies with a focus on multi-disciplinary research that aims to reduce the impact of natural, technological, social and intentional disasters.
<b>Decision Support Systems</b>	JCR IF: 4.71 (Q1). Foundations, functionality, interfaces, implementation, impacts, and evaluation of decision support systems.
<b>Prehospital Emergency Care</b>	JCR IF: 2.69 (Q2). International research relevant to the practice, educational advancement and investigation of emergency medical services.
<b>Socio-Economic Planning Sciences</b>	JCR IF: 4.14 (Q1). Operations research/management science, statistics, and related arenas, to in problems arising in socio-economic planning and development.
<b>Energy</b>	JCR IF: 5.537 (Q1). Covers research in mechanical engineering and thermal sciences, with a strong focus on energy analysis, energy modelling and prediction, integrated energy systems, energy planning and energy management.
<b>Journal of Environmental Management</b>	JCR IF: 4.865 (Q1). Publishes original research related to managing environmental systems and improving environmental quality, like system modelling and optimization, or social, economic and policy aspects.
<b>Opinio Juris in Comparatione</b>	<i>Opinio Juris in Comparatione</i> is an electronic open-access journal devoted to studies in comparative and national law. VALKYRIES will enquire about the legal aspects related to the enquired crisis management scenarios, taking advantage of the journal's international character and its openness to publication in several languages.
<b>Safety Science</b>	JCR IF: 4.105 (Q1). Physics and engineering of safety; its social, policy and organizational aspects; the assessment, management and communication of risks; effectiveness of control and management techniques for safety; standardization, legislation, inspection, insurance, costing aspects, human behaviour and safety.
<b>International Data Privacy Law</b>	JCR IF: 4.162 (Q1) Data protection and privacy law topics from around the world. This includes coverage in Europe (including the GDPR) and other regions such as Africa, Asia-Pacific, and the Americas, as well as at the international level.

**Conferences and events, including trade shows and exhibitions:** Industry and other non-scientific conferences will be excellent platforms to disseminate the project findings and start direct conversations with target audiences, particularly events related to defence. The Consortium aims to get speaking slots and co-host VALKYRIES workshops at some of the conferences shown in the table below. Moreover, the VALKYRIES Consortium will also show project results at fairs and congresses to increase awareness and stakeholder engagement.

<b>Event/Forum</b>	<b>Main dissemination aspects</b>
<b>DG ECHO events (Civil Protection Forum) and additional EC events (DG CLIMA, DG ENV, JRC)</b>	The EU Civil Protection and Humanitarian Aid Operations periodically organizes events targeting all audiences, from public diffusion (Info days, Volunteering, raising awareness) up to experts (European Civil Protection Forum, regional workshops, etc.).
<b>Research Workshops of the International Federation of Red Cross and Red Crescent Societies</b>	The International Conference for decision-makers to discuss the world's most pressing humanitarian issues and adopt resolutions that guide future humanitarian action, international humanitarian law (IHL) and legal frameworks for disaster management.
<b>The International Emergency Management Society (TIEMS) events</b>	TIEMS activities comprise international conferences, workshops and exhibitions task force groups of experts from TIEMS international group of experts, and TIEMS academy providing international education, training and certification programs.
<b>European Commission Community of User events</b>	Meeting point of for the different "EU research families," namely various programmes of DG RTD, DG CNECT, and DG HOME, as well as the Joint Research Centre (JRC).
<b>European Civil Protection Forum</b>	Gathers representatives from the European civil protection community, first-line responders, European institutions, etc. to discuss the current developments in the Union Civil Protection Mechanism framework and put forward new ideas.
<b>Security Standardisation Research Conference</b>	Research on security standardisation, including, but not restricted to, work on cryptographic techniques, security management, security evaluation criteria, security policy, network security, privacy and identity management, smart cards and RFID tags, biometrics, security modules, and industry-specific security standard.
<b>International Disaster and Risk Conference (IDRC)</b>	World's leading conferences on integrative risk management, gathering business leaders, decision-makers, practitioners, UN-, IO- & NGO-agents, and scientists that share and discuss new findings and experiences about the broad spectrum of risks societies are facing today.
<b>International Conference on Preparedness &amp; Response to Emergencies &amp; Disasters</b>	This conference will provide an opportunity for professionals from around the world to share the latest findings and new experiences concerning health system readiness for disasters and emergencies of all types.
<b>Military Communications and Information Systems Conference (MilCIS)</b>	The event facilitates a continuing dialogue between the Department of Defence employees, contractors, industry and researchers to discuss current and developing technological capabilities, project initiatives, and operational requirements.

<b>International Conference on Dependable Systems and Networks</b>	CORE A. Fusion between dependability and security research, understanding the need to simultaneously fight against accidental faults, intentional cyber-attacks, design errors, and unexpected operating conditions. It is also providing fruitful ground for academia and industry interaction.
<b>Computer Privacy and Data Protection (CDPD)</b>	Computer Privacy and Data Protection is the leading annual conference on privacy and data protection. VALKYRIES aims at regularly holding panels to discuss its advances and main issues publicly.
<b>SEGUREX</b>	Segurex is the most important security fair organised in Portugal. PARTICLE will present results of VALKYRIES to potential customers and stakeholders.
<b>MILIPOL PARIS</b>	The Milipol Paris is one of the largest trade fairs for safety. International exhibitors show the latest trends, techniques and equipment in the industry. PARTICLE will present results of VALKYRIES to potential customers and stakeholders, seeking to expand its international customer base.
<b>European Emergency Medicine Congress</b>	Annual international congress of the European Society for Emergency Medicine (EUSEM). The Consortium aims to disseminate and to discuss the results of VALKYRIES in this forum.

**VALKYRIES workshops:** The Consortium will organise the following VALKYRIES workshops aimed at mobilising key stakeholders and promoting the exchange of ideas among stakeholders and the scheduling of follow-up actions. It is expected that they will also lead to new business opportunities and related relationships between certification, regulation and standardization entities, end-user groups, academy/RTOs and industry.

<b>First VALKYRIES Workshop (M6)</b>	
The first VALKYRIES workshop will take place at the end of the first year, to present the project's status and achievements (requirements, scope of the demonstrators, normalization plans, consultation strategy, terminology and semantics, pre-standardization map, etc.) and receive feedback from stakeholders to improve the impact of the final results, being taken into consideration when designing harmonization tactics and reference integrating the efforts to be conducted. <b>Main objective:</b> Present the VALKYRIES progress and its current outcomes to VALKYRIES stakeholders. Ask them for feedback and discuss expectations and possible exploitation approaches. The received suggestions shall enhance the VALKYRIES tasks to be conducted, settling the grounds for the rest of the project.	
<b>Second VALKYRIES Workshop (M12)</b>	
The second VALKYRIES workshop is scheduled at the end of the first year of the project, and will have as main target to disseminate the intermediate project outcomes and discuss the status and expectations from the reference integration; based on them, discuss with the present stakeholders the best suitable standardization and exploitation foreseen actions. <b>Main objective:</b> Present the intermediate outcomes of the VALKYRIES project to the different groups of stakeholders. Based on that, it will be possible to refine the ongoing reference integration and to enhance the direction of the initiated pre-standardization, standardization and harmonization actions.	
<b>Third VALKYRIES Workshop (M24)</b>	
The third VALKYRIES workshop is scheduled at the end of the project and will have as the main target to disseminate the final project outcomes, and based on them, discuss with the best and post-project exploitation opportunities. <b>Main objective:</b> Present the outcomes of the project to stakeholders. Based on that, it will make possible to better assess the impact in the invited communities and receive feedback about the planned final and post-project exploitation actions.	
<b>Ethical-Legal VALKYRIES Workshops (M6, M12, M18, M24)</b>	
These workshops will be organised to sensitize the ethical-legal framework in the VALKYRIES context and to discuss the progress on the development of protocols with stakeholders. The same workshop will be taken in VALKYRIES to reach the most comprehensive number of stakeholders. <b>Main objective:</b> Disseminate and discuss the VALKYRIES results on the ethical-legal issues and to discuss concrete regulatory solutions to standardisation and interoperability goals regarding data and technology in the field of VALKYRIES disaster management scenarios.	
<b>Standardization VALKYRIES Workshops (M6, M12, M18, M24)</b>	
These workshops will be organized in parallel to the VALKYRIES' ethical-legal, closing the external stakeholders related to regulation, standardization, certification and harmonization to the Consortium activities. Their main targets will be to discuss the opportunities and progress on the actions mentioned above and getting close to the ongoing/planned Pan-European efforts (institutes, agencies, etc.) and working groups and end-users. <b>Main objective:</b> Disseminate and discuss VALKYRIES results on the regulation, standardization, certification and harmonization issues towards raise awareness of the project results and get alignment with European and International actions.	

**Communities, groups and initiatives:** The Consortium expects that different communities, working groups, EU initiatives, and stakeholders' groups (practitioners, regulation and standardization institutions, RTOs, academy, military, etc.), will be interested in the VALKYRIES outcomes (some of them enumerated in the Table below).

Entity	Main dissemination aspects
<b>European Joint Research Centre</b>	The European Joint Research Centre is the Commission's science and knowledge service to carry out research and provide independent scientific advice and support to EU policy.
<b>Integrated Mission Group for Security</b>	Open forum which brings together technology experts from Industry, SMEs, Research and Technology Organisations (RTOs) and Academia.

<b>European Organisation for Security</b>	Represents the interests and expertise of MS involved in Security providing technology Solutions and Services from the different countries of the European Economic Area, representing more than 65% of the European Security Market and 2 million employees in Europe.
<b>European Committee for Standardization</b>	public standards organization to foster the economy of EU in global trading, maintenance and distribution of coherent sets of standards and specifications.
<b>International Electrotechnical Commission</b>	Worldwide organization for standardization comprising all national electro-technical committees (IEC National Committees). Prepares and publishes international standards for all electrical, electronic and related technologies.
<b>Institute of Electrical and Electronics Engineers</b>	The International professional association for Electronic Engineering and Electrical Engineering (and associated disciplines) that where members collaborate on world-changing technologies –from computing and sustainable energy systems to communications, healthcare, and more.
<b>Security Technology Assessment Unit</b>	Research towards the standardization and harmonisation of the protection of European networked infrastructures and hazardous industrial installations.
<b>European Defence Agency</b>	supports the Council and the Member States in their effort to improve the EU's defence capabilities for the Common Security and Defence Policy (CSDP).
<b>Red Cross/Red Crescent</b>	The international humanitarian movement founded to protect human life and health, to ensure respect for all human beings, and to prevent and alleviate human suffering.
<b>EU Civil Protection and Humanitarian Aid</b>	EC's department for overseas humanitarian aid and civil protection. It aims to save and preserve life, prevent and alleviate human suffering and safeguard the integrity and dignity of populations affected by natural disasters and man-made crises.
<b>Computer Privacy and Data Protection</b>	As a world-leading multidisciplinary conference CPDP offers the cutting edge in legal, regulatory, academic and technological development in privacy and data protection.
<b>Big Data Value Association (BDVA)</b>	Industry-driven international not-for-profit organisation with 200 members all over Europe. BDVA is the private counterpart to the EU Commission to implement the Big Data Value PPP program.
<b>European Factories of the Future Research Association</b>	Non-for-profit, industry-driven association. The key objective of EFFRA is to promote pre-competitive research on production technologies within the European Research Area by engaging in a public-private partnership with the EU called 'Factories of the Future.'
<b>SoBigData++</b>	SoBigData++ is the European Integrated Infrastructure for Social Mining and Big Data Analytics to deliver a distributed, Pan-European, multi-disciplinary research infrastructure for big social data analytics, coupled with the consolidation of a cross-disciplinary European research community, aimed at using social mining and big data to understand the complexity of our contemporary. Its large international and multidisciplinary community focused on the legal and ethical aspects of most of the technologies developed/employed in VALKYRIES. SSA as a member of SoBigData++ will leverage its dissemination channels to disseminate VALKYRIES' results.
<b>European Society for Emergency Medicine (EUSEM)</b>	The European Society for Emergency Medicine (EUSEM) is a non-profit scientific organisation born in 1994 whose aim is to promote and foster the concept, philosophy and the art of emergency medicine throughout Europe. Its Disaster Medicine Section was officially established in Munich in September 2008.

**Letters of Support:** The capability of attracting the support of heterogeneous national, European and international stakeholders will be essential to guarantee the feasibility and sustainability of the decisions made, in a preliminary stage, and before the enforcement of the Consultation Strategy (D1.7).

The following entities have manifested their interest in supporting VALKYRIES by tracking progress and taking part on the project events that require external participation: **National Institute of Standards and Technology NIST** (standardization institute, US), **Department for Digital Transformation-Presidency of the Council of Ministers** (governmental, Italy), **Coastal Administration Centre for Emergency Response** (emergency responder, Norway), **Falck Servicios Sanitarios (EMS, Spain)**, **Dirección General de Protección Civil y Emergencias** (first responders, Spain), **Centro Coordinador de Urgencias y Emergencias 112 Extremadura** (first responders, Spain), **Ambulancias CSA** (health logistics, Spain), **Elance Helicopter Global Service SL** (health logistics, Spain), **AFCEA Sofia Chapter** (non-profit association, Bulgaria), **Spanish National Cybersecurity Institute INCIBE** (governmental, Spain) and the **Hellenic Police** (LEA, Greece). Their signed letters of support at attached at the annexes.

### 2.2.1.2. Exploitation plan

The VALKYRIES project will provide a general-purpose solution for sustainably prompting the pre-standardization, standardization and harmonization of first aid response capabilities towards enhancing the EU resiliency to Multi-Casualty cross-border disasters (see Section 1.4.1). The project aims to produce novel methodological approaches and technological, procedural and collaborative solutions derived from the identified and addressed opportunities, including new pre-standardization and certification actions, standards and patents; most of them vaguely present in the National, European or International markets. Bearing this in mind, during the proposal preparation phase, the VALKYRIES Consortium has identified the following potential exploitation options for consideration thorough the project life cycle:

- **Open source licence of complete or partial project results:** Under a commonly accepted and unambiguous Licence Agreement, e.g., MIT, Apache or Creative Commons, or a model specific to the project.
- **Transaction based charges:** In the case that the technology can be offered as a Software as a Service or metered, calls to VALKYRIES technologies will be on a per-transaction based charge.
- **Mixed models:** In the case that the auxiliary technologies are added to the core VALKYRIES results, a revenue model can be designed around the combination of both.
- **Direct sale of licences:** A straightforward commercialisation of the results by the project Consortium through a lead beneficiary, Spin-Off or other authorised third party.
- **User types model:** Make technologies free of charge or with differentiated prices depending on the type of user.
- **“Give and Take” models:** As found in the Guaranteed Electronic Markets concept, in short, operate a system of allowing unfettered access to those who add to VALKYRIES, either materially and/or via contributions to the further development of the technology.
- **Subscription model:** A charge for access to the VALKYRIES technologies on a subscription basis. A pricing model will be suitably designed.
- **Pay on deploy model:** Provide cost-free access to technology in development phases and charge a licence when the technology is deployed in a final application.
- **Open Source with ring-fencing:** Core elements of the VALKYRIES results are made available open-source at a reduced cost or free of charge while those parts that are either commercially sensitive or valuable to a partner are restricted under a commercial licence or “Ring-Fenced” for some time.

On the other hand, the results of the reference integration to be developed through the VALKYRIES project assumed a modular and flexible architecture, thus enabling different components to be exploited individually as stand-alone products.

**Shared Commercialisation Strategy and Plan – beyond the project’s lifetime.** The relevance of the needs to be addressed by both VALKYRIES’ normalization actions and reference integration to a wide range of target audiences underpins the commercialisation potential of the project outcomes. In this respect, commercialisation and IP management activities have been included in the project plan as part of WP3, which is dedicated to the potential of the project results towards Certification but also the sustainable exploitation of these project results. During this WP, a commercialisation strategy and detailed commercialisation plan will be conducted (T3.6). They will constitute a live document from the beginning of the project. That shall include a detailed analysis of each customer segment, the specific problem being addressed for each segment, and the quantifiable business value that VALKYRIES will deliver. A comprehensive go-to-market and financial plan will provide confidence for external investors to support VALKYRIES outcomes as suitable for scaling as a standalone commercial venture. During the proposal preparation, an initial commercialisation plan has been developed and is detailed below. We performed a preliminary market assessment to ensure the potential commercialization of project results and guarantee the return of the partner’s not EU-funded investment. The Consortium end-user partners (i.e., SMS, ISEMI, BRC, HESE, ATA, and AREU) and external collaborative entities (see the signed Letters of Support at the proposal submission annexes) have expressed their interest in being early adopters/end-users of the normalization outcomes and reference integration, playing a key role in showcasing them, especially at the end of the project.

**Global market size, potential & opportunities.** In a report adopted on 5 March, Parliament’s environment committee said funding for the EU Civil Protection Mechanism should be at least €1.4 billion in 2021-2027, as proposed by the EC [EPC19], which also included the preliminary sectorial expectations to managing the coronavirus outbreak. The global incident and emergency management market size are expected to grow from USD 117.2 billion in 2020 to USD 156.1 billion by 2025, at a CAGR of 5.9% from 2020 to 2025. The increasing criminal activities and terrorist attacks, and the occurrence of unpredictable natural disasters due to the ever-changing climate conditions are some of the major factors expected to drive the growth of this market, from which now it shall be included the coronavirus pandemic [MAM20]. According to this report, a critical factor on this growth will be the digitalization of the sector, during this period the first responder tools segment being expected to grow at a higher rate. Solutions for assisting departments and teams in providing first aid or action during emergencies rely on sophisticated communication and wearable devices such as smart glass, smartwatch, wearable camera, Terrestrial Trunked Radio (TETRA), Ultra High Frequency (UHF) and Very High Frequency (VHF) radios, and land mobile radios; are expected to evolve with public safety LTE communication solutions along with next-generation software-defined radios and cognitive radios. Though radios have traditionally been the most used first responder tools in case of emergencies, the use of



smartphones and smart devices are the most preferred first responder tools, which has increased tremendously over the past decade. In the current scenario, smart gateways can connect sensors, such as body cameras, heart rate monitors, and locator beacons worn by the first responders and feed that data back to a command centre so that it can be accessed at a later stage. Particular efforts will be put on close the gap between technology and practitioners, so based on the report, the vertical education segment is expected to account for the broader market share during the forecast period hand in hand with the training and simulation services segment.

**Market, Technological, Legal and Human drivers.** Across the industry, a number of key market drivers are at play which create an opportunity especially for solutions able to close the gaps between the digitalization of the first emergency sectors and the end/users/practitioners by: 1) evolving the threat landscape up to technological and Climate Change related disasters, calling for higher level of technical and human disaster management preparedness; and 2) Legal developments worldwide and in the EU concerning disaster resiliency, but also those that affect the emerging and disruptive solutions that arrive to markets, calling for enhanced cooperation and forward-looking readiness against divergences and incompatibilities; 3) Increasing awareness about disaster management issues at all levels of the European economy, highlighting those related with the development of a sustainable EU Security Market (Circular Economies, Energy Efficient, compliant with the environmental protection policies, etc); 4) Restricted budgets across all sectors; among them being required more efficiencies in harmonization and cross-border training budgets; and 5) shortage of advanced skills calling for scalable, on-demand available training platform to close skills gaps and related certifications/accreditations.

**Business Canvas analysis.** VALKYRIES will adopt the contemporary business model canvas method of Osterwalder [SAFE] to fast track the business modelling and commercialisation steps of the project. This model is widely used throughout the industry and will be used as the basis for commercial exploitation of the outputs.

**Strategy for market take-up.** Critical tasks to VALKYRIES are those to be carried out in the project for market take-up and deployment of results. Task T3.6 will define a plan for the commercial deployment of the results: which service models will be delivered first, which target end-users will be addressed during the initial stage of the project, which technical parts will be prepared first, etc. Different scenarios will be drafted depending on the amount of investment potentially obtained. The time to market of the final results of the project could be divided into two separated phases:

- **Phase 1.** This stage consists in continuous testing and validation of the VALKYRIES solutions, based on the results obtained and validated by proofs and demonstrations, by replicating among other stakeholders across Europe and the new community user groups, to have many implementations in different domains: 1) continue with reference implementation phase and wide-spreading the knowledge among European stakeholders (months 0-6 after the end of the project); and 2) look for additional investment for global deployment of VALKYRIES solutions. Time to market of the procedures to be implemented – 6 months after the end of the project.
- **Phase 2.** Reference Integrations evolved and widely implemented in the market: 1) implementation of the market and legal procedures validated in phase 1 by the intermediary-users participating VALKYRIES and other stakeholders (months 6-12 after the end of the project); 2) Creation and packaging of VALKYRIES specific new products and services following the feedback and recommendations from end-users. Time to market: 12 months after the end of the project

**Key exploitable results.** The key exploitable results of VALKYRIES are standards and the commercialization of most of the reference harmonized and integrated solutions, which are expected to be commercialized by some of the models mentioned above. They will range for novel technologies/equipment to Education/training and new certification opportunities. The Consortium will also focus on the exploitation of the key elements of IP that are deemed to have commercial value. The Table summarises the main exploitable VALKYRIES results and foreseen business approaches per area, which will be refined at the end of the project in D3.6.

outcome	Description	Business Action
<b>Ethics and Regulation</b>	Harmonised guidelines and procedures for first aid responders to manage GDPR and other related regulations compliance in disaster environments, as components of a larger interconnected platform able to drive innovators to	A Data Management Platform that includes a tool to manage information regarding cross-border crises is envisaged and offered as a service. The know-how developed along with the DaMP will create the premises for a start-up to be a spin-off of SSA for its exploitation. Other actions are related to

	guarantee fundamental rights in each enabled data flow.	commercialization of harmonized tools for regulatory compliance (e.g., Privacy Enhancing Technologies for GDPR)
<b>Pre-standardisation and Standardisation</b>	COTS solutions for supporting and guiding pre-standardisation and standardisation actions, adapted to the rationale decision-making paradigm to be developed by VALKYRIES, that bring collaborative environments, allow sharing related information and harmonise the disruptive capabilities to be deployed during the reference integration.	Customization to the client and standardization sector requirements. Specific adaptation to the managing technological, procedural or operational disruptions, as well as changes in sustainability-related regulations. Produced dashboards and information sharing tools will be offered as a service. The accessibility to updated pre-standardization and standardization maps may be commercialized under subscription models, where premium users will have a faster notification of changes.
<b>Evaluation and Certification</b>	Procedures and capabilities for supporting the harmonized evaluation and certification of first aid response solutions, entities and personnel, ranging from software, procedures, infrastructure, etc. Test criteria, benchmarks and datasets; Evolution of certification facilities; models, guidelines, information sharing tools for certification of new opportunities	Although the Datasets generated during the project will be distributed via the EU Open Data Portal, they may be extended and/or customized based on the clients' requirements. Commercialisation of the libraries depends on the options offered by the platform, but typically it means licencing an extension/plugin. Licences can be distributed for free to EU agencies and sold for a fee for commercial entities (upgrades and updated licences). Commercialisation to non-EU agencies.
<b>Harmonisation</b>	Procedures and capabilities that supported the design and implementation of the VALKYRIES OODA-based model for agile harmonization, including methods for rational decision-making adapted to the needs of the sector. Harmonized solutions, ranging from concepts and semantics, to protocols and product definitions.	Customization to client needs, and adaptation towards covering the particularities of different entities; Evolutions towards closing the digitalization gaps on alternative sectors (Industry 4.0/5.0, Transport, Building, etc.). Commercialisation of upgrades/updated licences; commercialisation to non-EU agencies; Harmonized solutions exploited described in their corresponding row of this table: technologies, procedures, etc.
<b>Technologies and Equipment (KARA)</b>	Technologies and Equipment for supporting cross-border disaster management and information and data sharing between partners and external stakeholders. Harmonized solutions driven by IA, new generation instrumentation, ICT systems and infrastructure, end-user terminals, harmonized health wearable solutions, etc.	Digital and Physical solutions may be deployed as a standalone product or as libraries/components within an existing data integration platform. Their commercialisation depends on the options offered by the platform, but typically it means licencing extensions/plugins. Licences can be distributed for free to EU non-profit agencies and sold for a fee for "for-profit" entities. Customised deployment to alternative operational environments; separated exploitation of algorithms, sensors, modules, etc.
<b>Common Practices and Operational Procedures (HERJA)</b>	Common Procedures and Operational Procedures for supporting cross-border disaster management and information and data sharing between partners and external stakeholders: assessment of situation, triage and pre-hospitalization actions on MCI, C&C, alerting and warning.	Commercialisation of upgrades and updated licences; commercialisation to non-EU agencies; customised deployments (e.g., desktop applications, on demand deployments, etc.). Customised deployment to alternative operational environments and requirements. Separated exploitation of algorithms, sensors, modules, etc. As a service provisioning.
<b>Cooperation and resource federation (EIR)</b>	Maps, procedures and services for supporting cross-border disaster management and information and data sharing between partners and external stakeholders. Protocols, strategies and novel procedures for cross-border and cross-sectorial cooperation (including volunteering devices, civil-military cooperation). Harmonized capabilities for federating knowledge between	Knowledge representation and information ontologies extended to alternative disaster scenarios. They can be exploited as a whole, or individually, through any of the business models identified above. Commercialisation of the libraries depends on the options offered by the platform, but typically it means licencing an extension/plugin. Licences can be distributed for free to EU agencies and sold for a fee for commercial entities (upgrades/updated licences). Commercialisation to

	responders and/or other stakeholders (suppliers, RTOs, institutions, certification agencies, etc.).	non-EU agencies; customised deployments (e.g., desktop applications, on demand deployments, etc.). Customised deployment to alternative operational environments.
<b>Education and Training (EIR)</b>	Procedures, and capabilities for applying Lean Learning procedures between cross-sectorial and cross-border stakeholders (exchange of lessons learned, field notes, joint analysis of situations). Education/Training material for supporting from lessons to table-top and virtualized (simulation, cyber ranges, etc.) exercises	Customised deployments together with other VALKYRIES components, or separately, to be exploited driven by some of the business models described above. Separated exploitation of education material. As a service provisioning of some of the developed capabilities. Adaptation of education and training material to particular needs of the client, sector, and different disaster situations.
<b>Reference Integration (SIGRUN)</b>	Integrated and modular SIGRUN solution for managing and federating crisis management technologies, and its applications for the use cases' scenarios. It can be commercialized as a whole, or as separated subsystems: Data Centralization, Command and Control Application, Mobile Application, etc.	Licensing model for software components (free-to-use, pay-per-use, annual fee) calculated based on agreed service level agreements; purchase of devices (different kits available); and customised developments (e.g., on-site deployment vs. SaaS) and customer support. Offered free of charge for EU agencies; commercialisation of upgrades and updated licences; commercialisation to non-EU agencies; and customised deployments.

### **INDIVIDUAL EXPLOITATION PLANS**

Individually, the expertise in the market and the intense weight of industrial partners in VALKYRIES ensures the rapid introduction of the different solutions. However, all the partners in the VALKYRIES Consortium, including not only the industry and SME companies, but universities and research centres are also interested in the commercialisation and knowledge transfer activities by exploiting the innovation outcomes of the project. Consequently, a detailed exploitation strategy and plan for each partner will be worked out in the exploitation task T3.6, which will build on the following preliminary individual exploitation plans (see the table below).

<b>End-users</b>
<b>SER-SMS</b> being a public body in charge of offering health services to Madrid Region, thus targeting 6.8 million users, might support the sustainability of the project outcomes and results by sharing them with the responsible policy and decision makers, requesting them to assess their suitability to be incorporated into current protocols, practices and technologies, thus supporting the knowledge and eventually the actual use of the newly developed standards.
<b>AREU</b> is a regional public company and is interested in the constant improvement of its resources. Also, AREU is interested in all tasks concerning human resources, technologies and communication systems as instruments that can improve its performance standards. In that way, AREU has a great interest in the results of VALKYRIES projects that can be delivered regionally and nationally and can improve the performances of AREU, particularly in the field of disaster medicine.
<b>HESE</b> , as public institution, is constant investment in human resources and the use of modern information and communication systems and technologies that support its high standards of technical and scientific performance, duly reflected in the quality of patient care, especially in highly demanding conditions such as disaster response and cross-border collaboration. In this regard, HESE sees with great interest the adoption of VALKYRIES technologies by its organisation to improve its degree of readiness and healthcare provision, policies and processes in place, including the articulation with the local civil protection authorities.
<b>BRC</b> pays interest in the opportunities that will be created by the project communication interoperability with teams in different international locations, which may prove valuable in the context of the broader Red Cross Red Crescent Movement. The reason for this is that the Movement's international disaster response around the world is based on "surge capacity" – a pool of professionals from all countries in the world, uniformly trained and prepared following internationally recognised disaster response competences. They are deployed to the disaster affected areas around the globe with the mission to respond to the emergency, and often they operate in a very complex and insecure environment. The achievement of the project deliverables may significantly contribute to building interoperability, not only in Europe but also on other continents.
<b>HRT</b> will use the results of the project to be incorporated in its rescue mechanism to strengthen its role as well as its efficiency during an event and to support national authorities. The exploitation domain is primarily the support

<p>of national authorities and, more specifically, other First Responders who operate in SAR missions in cases of urgent needs and massive disasters, either in Greece or abroad. HRT plans to adopt the methodologies in its training exercises as also to propose similar training procedures with authorities and other volunteer organizations. Last but not least, HRT will use the platform as a basic tool in future projects to promote its use and to support its further development.</p>
<p><b>ISEMI</b> is a professional platform of former or active police and national security officers, military, civil protection and crisis management experts from around the world. Its main exploitation interest comes from the reinforcement and harmonization of its security clearance and relevant long-term experience in crime prevention, counterterrorism and CBRN-E threats, in the fight against organized crime, environmental crime, trafficking in human beings, cybercrime, drugs and weapons smuggling. VALKYRIES outcomes will serve to enhance its capabilities for cooperating with cross-sectorial responders, as is the de case of the EMS, while strengthening its background and solution for managing intentional disasters.</p>
<p><b>Industry/SMEs</b></p>
<p><b>IND</b> develops novel products that are commercialised through its different vertical divisions as well as partners and channels all across the globe. For the disciplines targeted by the VALKYRIES project (simulation, decision making, mission planning, risk identification and management, etc.), IND has its own lines of product, which are regarded as strategic within its portfolio of R&amp;D actions, thus facilitating the innovation to market transition. The resulting solutions will be delivered nationally, at the EU level and in international target markets (up to 40+ countries).</p>
<p><b>TAS</b> has the following primary exploitation objectives derived from its participation in the VALKYRIES project: 1) Progress in the business line of TAS. 2) Consolidation of TAS in the Hispanic market and projection in the European and Latin American markets. 3) The exploitation of the project results, under the terms established in the Consortium Agreement, the Intellectual Property agreement and the Grant agreement. These three primary objectives would be specified in the following main activities: A) Participation in the commercial exploitation of the project outcomes. B) Own use of the project results and outcomes by TAS in its training activities C) Provision of specialized consulting services, based on the previous background and the knowledge acquired in the development of VALKYRIES. The know-how developed along with the DaMP will create the premises for a start-up to be a spin-off of SSA for its exploitation.</p>
<p><b>NOVOTEC</b> develops consultancy services that are commercialised through sectors that could be interested in this kind of asset, as well as partners and channels all across the globe, for the disciplines targeted by the VALKYRIES project (simulation, decision making, mission planning, risk identification and management, etc.). The resulting solutions will be delivered nationally, at the EU level and in international target markets (up to 60+ countries).</p>
<p><b>PARTICLE</b> is an R&amp;D intensive SME, specialised in the exploitation of IoT technologies to create intelligent ambiances promoting secure societies. PARTICLE aims to exploit the outcomes of the VALKYRIES project to advance the capabilities offered by its solutions portfolio and acquire sound competitive advantage in the market, leveraging on the company's customer base. Specifically, PARTICLE will mature the eSafer platform (including mobile applications), with the VALKYRIES developments involving advanced emergency assistance services, improved mobile communications, improved information exchange mechanisms (cross-border, cross-organisation) and Command &amp; Control &amp; Coordination capabilities, to consolidate its commercial stance. Besides, PARTICLE will benefit from the VALKYRIES Project's results to explore the participation in joint exploitation of software solutions and services with research institutes and companies complementing our offer, the fostering of strategic partnerships with European emergency authorities and service providers as a specialised software provider, and the participation in future collaborative R&amp;D endeavours to build state-of-the-art knowledge and expertise and innovative solutions for forthcoming challenges to the healthcare, emergency, public safety and security markets.</p>
<p><b>BLC</b> plans to conduct exploitation activities in the Dutch market to utilize the results of the VALKYRIES project. The activities will aim to approach relevant communities, groups of end-users and establish collaboration with them to be informed about the technological innovations of the project and the capabilities it arises.</p>
<p><b>ARA</b> will exploit the VALKYRIES outcomes towards improving its large portfolio of space and satellite technologies, making them more available and approachable to end-users with value-added services in the areas of Disaster Management, Environmental protection, Land Use and Urban Planning, Agricultural Monitoring, GIS modelling, mobile computing and Machine-to-Machine communication; and exploring the harmonization potential of BLOS communication capabilities, like SATCOM, ad-hoc networks, mobile platforms, M2M communication, etc.</p>
<p><b>RTOs</b></p>
<p><b>KEM</b> is the scientific consultant of the Ministry of Citizen Protection of Greece. According to this role, a top priority to construct a roadmap for the Hellenic First Responders to exploit the outcomes (improved SOPs and standards) offered by the VALKYRIES project. New guidelines, rules and standard operating procedures will be further exploited by the Hellenic FR organizations, which are supervised by the Ministry of Citizen Protection and other relevant ministries (Ministry of Health, Ministry of Defense). Fire services, paramedics, police, hospitals</p>



and civil local, regional and national protection offices that KEM collaborates with, across Europe, will benefit as well from the outcomes of the VALKYRIES project.
<b>UMU</b> has as a main pillar of its strategy the innovation, having end-to-end trust and privacy management, cybersecurity and AI techniques and as part of its key lines of development. The knowledge transfer from R&D projects to national and EU companies is also key for the UMU team. UMU will be also expanding the portfolio of Master and PhD courses used for CS and IT students as well as professionals willing to have access to the latest research and development tendencies, in addition to how they can be applied to realistic scenarios such as the ones conceived in the VALKYRIES demonstrators. The results will end up with several publications (not less than 5) in top conferences and JCR-ranked journals and the defence of 1 PhD dissertation aligned with project objectives. UMU will also create one fully functional PoC (TRL 6-7) from its work in the project, which will be added to the strong portfolio of PoCs that UMU is having and using as a vehicle for knowledge transfer.
<b>SSA</b> , as a higher education public institution, is a non-profit organisation that will not perform commercial exploitation of the project's results. Nevertheless, SSA has significant benefits to reap from the project results. SSA will use the VALKYRIES' outcomes to produce high-quality and high-impact publications on ethical and legal issues related to the topic of the project, such as data protection, IP law and standardisation. This will strengthen the track record of the institution. SSA will also incorporate the research results of the project in courses related to the topic of the project, such as data protection and IP law. This will enhance the courses' curricula with new research and will update the training provided to the current state of the art. SSA will also use this capacity to access funding opportunities in the future.
<b>BDI's</b> exploitation interests are in the opportunity to help and support the Bulgarian authorities, and particularly, the Bulgarian MoD on defence and security policy formulation and implementation. The main focus will be on multidisciplinary scientific activities that cover both ICT and human, social and societal factors, CBRNE and standardization domains. BDI will exploit its links to many EDA and NATO STO activities and international projects to disseminate VALKYRIES results and will organise several special sessions/tracks focused on VALKYRIES project data and findings under the Military Technology and Systems (MT&S) conference, organised and hosted by BDI, and the defence, antiterrorism and security exhibition HEMUS organised under the auspices of the Bulgarian Ministry of Defence.
<b>USN</b> improves situation awareness in all organisation related to maritime rescue operations as well as politics (Departments, national government and so on). USN will participate in conferences related to the topic. Teach and educate future maritime personnel and rescue teams

## 2.2.2. Standardisation strategy and Regulation activities

The standardization and regulation activities of VALKYRIES include both the adoption of existing standards and regulations in the relevant domains, as well as follow up on such standards and actively contribute to their evolution or creation of new ones. This is of paramount importance since regulation and standardization offers a systematic and organised approach to deal with project execution, as well as a reference terminology that often stems from the consensus of different stakeholders, thus helping cross-sectorial partners to use concepts that are commonly understood by the community both within and outside the project Consortium. On the other hand, the wide spreading of the expertise included in the Consortium, the nature of the data that will be acquired as well as their analysis leaves opportunities for VALKYRIES to contribute to regulation and standardisation activities. Several consortium members are engaged in such processes and have the intention to communicate VALKYRIES outcomes to their initiatives and communities (a list of foreseen initiatives per partner are summarized in the table below). This will be accomplished through concept papers, deliverables, and use cases results, through the respective information channels and standardization representatives from the partners involved in the project.

**Standardization and regulation approach.** The commitment to National, European and International regulation and standardization actions entails the anchor of the project achievements in the research, and industry community as well as to provide new business opportunities to fill the EU Security Market. To achieve this, there is a long process to walk thought until a contribution to regulation and standard comes true. For example, most of the standardization bodies do not accept results, advice, and recommendations from research and innovation projects, which demands a perfect alignment between the project outcomes and the standardization landscape via well-established channels. In these grounds the VALKYRIES regulatory and standardizations will follow this iteration:

- **Step 1:** Regulation related results and recommendations will be manifested in deliverables, white papers, and publications. On the other hand, the project standardization opportunities (mainly outcomes of WP3 and W4 derived from the studying streams: technologies, procedures and collaboration) will be processed separately, so their public release does not hinder the standardization

process. The methodology for discovering standardization opportunities is imbued into the VALKYRIES harmonization approach (Section 1.3.1.1).

- **Step 2:** The standardization opportunities will be analysed by the External Advisory Board members and consulting other external stakeholders, including Standards Developing Organizations (SDO) members and delegates (which are not necessarily primarily working for the project) of the participating entities.
- **Step 3:** external interest and possibly support will be needed to support the SDO involvements. Project results should be discussed in the broader group within the SDO are regulatory bodies, targeting collaborators like Data protection and competition authorities, SC 27 Security Technologies, ITU-T, CEN, AENOR CTN 71 Information Technologies, NATO, EDA, etc.
- **Step 4:** concludes the process. Specifications are done based on embedding the results into existing and new specifications. Steps 2 and 3 are crucial since a lot of effort is required to bring a critical mass of interested parties together and start the discussion within SDO and related agencies, and get a reasonable number of supporters to finalize the specification, regulation proposals and/or standard contribution.

**Standardization and regulation overall aim.** To achieve visibility on regulation and standardization processes is one the most important elements towards a high project impact as well as demonstrating the technical, procedural and collaborative potential of the conducted efforts. VALKYRIES aims to have continuous involvement in various standardization activities in the broadest possible sense, being aware of the new standardization mechanisms offered by the open-source paradigm, by both using open source software for the project development and the further distribution of project results. The regulatory and standardization efforts of VALKYRIES will be:

Direct contribution: As indicated in the Table below, VALKYRIES partners are directly involved in different working groups of regulatory standardization bodies/initiatives as delegates, so the project's results are directly contributed to the relevant normalization activity by the involved team member. The contribution may range from bringing the VALKYRIES vision to related processes, up to triggering novel standardization/regulatory actions.

Indirect contribution: This applies when VALKYRIES partners are not directly involved, but the partner's organization has delegates in the respective and relevant working groups. Relevant results can be attributed to regulation and standardization by using the partner's established processes through the delegates.

Observing: Some regulatory and standardization bodies are working on topics that are not in the core of VALKYRIES, but nevertheless, they are of relevance. The Consortium will monitor and observe their progress.

**Concrete material for further pre-standardization, standardization and harmonization.** Among other, VALKYRIES will deliver joint terminology and semantics (D2.2); map of standardization actions and joint roadmap (D2.4); Dynamic Harmonization and Standardization methodology (D2.5); Report on relevant ethical-legal and societal aspects (D3.1); Report on the technical, legal, and ethical profiles related to the interoperability of first response capabilities (D3.2); capability opportunity maps (D4.1, D5.1, D6.1); capability harmonization gaps (D4.2, D5.2, D6.2); a roadmap for opportunity development (D4.3, D5.3, D6.3); VALKYRIES Reference Integration and lessons learned on the conducted harmonisations (D7.4).

End-users
<b>AREU</b> is an Italian regional public company that take care of more than 10 million people. It works in the integration of the intra and extra hospital healthcare emergency, to ensure a uniform and effective quality in territorial emergency rescue, to coordinate the transportation of organs, tissues and teams in making harvesting and transplantation, to acquire the assets of exchange and clearing of blood and blood components. AREU is very interested in the standardisation efforts from the VALKYRIES project. In fact, this is very important for this company to improve his performance in extra hospital emergency healthcare and to adequate his performance with other European organisations that they are usually collaborating with.
<b>SMS</b> belongs to the fast response team of Madrid Region (ERICAM), activated in case of natural or man-made disasters at the Regional, National, European and International catastrophes. ERICAM is a middle-range Unit authorized by UN-INSARAG, thus having an in-depth knowledge of the current standards and thus being a key advisor to the Consortium on how to advance on further standardizing and eventually improving the European currently existing ones.
<b>BRC</b> belongs to Bulgarian Unified rescue system with its Mountain rescue service – a sole SAR organisation in Bulgarian mountains. The 28 volunteer teams of BRC covers the whole country and plays the auxiliary role to the Civil protection state authority in mass disasters. The standardisation issues, especially in cross-border scenarios, are among the priorities of BRC as they are working on a daily base with all first responder organisations inland

and also abroad, when they send their experts and volunteers on the frame of Civil protection mechanism of EU or as part of RC/RC international movement missions.
<b>ISEMI</b> , as a non-profit organisation providing generally beneficial services, registered within the Registry of the Ministry of Interior, is interested in contributing and acquiring more relevance in standardisation issues to continue helping and giving support to critical scenarios where border protection, critical infrastructure protection, health protection and rescue and emergency assistance, among others, are directly or indirectly involved.
<b>HRT</b> , the Hellenic Rescue Team, is a volunteer non-profit Search and Rescue (SAR) organisation, with a human potential of 2,000 volunteers all over Greece. HRT's main mission is the search and rescue of people in need and the organisation of Aid Missions in natural and human-made disasters all over the world. Thus, all cross-border and cross-sector efforts in the project are directly impacting its daily work, and standardization and harmonization efforts are, therefore at the core of the business, both suggesting potential improvements and pushing with their experience to promote common procedures.
<b>HESE</b> is a public healthcare provider organisation serving more than 440,000 people with specialised medical services, so one of its major interests is to improve the current services being offered with a joint roadmap for standardisation, concerning healthcare systems, as well as supporting and enhancing dynamic standardisation concerns.
<b>Industry/SMEs</b>
<b>IND</b> is an active participant in national and international standard bodies and standardisation committees in the fields of information systems and cybersecurity, including AENOR CTN 71 Information Technology – SC 27 Security Technologies, CEN (European Committee for Standardisation) – TC 224 Personal identification, electronic signature and cards and their related systems and operations – Working Group WG 17 Protection profiles in the context of electronic signature, EDA (European Defence Agency) – Information Acquisition & Processing (IAP) 4 CIS & Networks, IEEE Institute of Electrical and Electronics Engineers, and IETF Internet Engineering Task Force (IETF), to name a few.
<b>TAS</b> will work on the establishment of common normative recommendations and requirements for the development of innovative best practices/global standards/certification solutions in the management of mass casualty incidents and disasters. TAS will contribute especially analysing the needs related to standardization in the intervention of emergency medical services and defining the “minimum set of data,” in aspects such as operational procedures, search & rescue, triage, care and medical evacuation of victims, operational communications, data transmission, and on-site and remote command and control. To do this, TAS will identify the key aspects that underlie all relevant processes in the medical and global response to accidents with multiple victims and disasters, with particular attention to factors related to trans-agency and cross-border situations. To promote the establishment and consolidation of standards on those fields, TAS will be supported by the Consortium partners and the professional, scientific and academic network established through its training programs and research projects.
<b>NOVOTEC</b> is an active participant in international and national standard bodies and standardisation committees in the fields of information systems and products, including CEN (European Committee for Standardisation). Inside NOVOTEC there is a certification body active in the whole standardization process. NOVOTEC, given its wide experience, will be leading the efforts of the VALKYRIES project in this direction and driving the 4 steps process on standardization and regulation described before.
<b>PARTICLE</b> is a start-up SME dedicated to cyber-physical systems for the smart healthcare and wellbeing, public safety, emergency and security business markets. Its intention regarding standardization efforts is entirely focused on the involvement in both the European Emergency Number Association (EENA) and the Pan-European Mobile Emergency Applications (PEMEA).
<b>BLC</b> is an SME whose main target is the implementation of the latest improvements in Blockchain technology into secure and innovative solutions. Their standardization work not only focuses on the activities related to Blockchain, but also on other emerging and complementary solutions such as Distributed Ledger Technology (DLT) which, tightly joined with Blockchain, can extend the existing security landscape towards more distributed environments like the ones contemplated in the cross-sector and cross-border vision of VALKYRIES.
<b>ARA</b> is an SME with major expertise in value-added downstream services for the citizens, delivering products and services designed upon the users' needs and requirements. Due to this technological knowledge and interests, ARA will contribute and participate in existing Working Groups in standardization to improve and gain better experience in issues related to data management in multi-parties' scenarios, especially the ones related with the cross-sector and cross-border.
<b>RTOs</b>
<b>KEM</b> brings together all national Law Enforcement Agencies (Police, Fire Service, Coast Guard, etc.), Civil Protection agencies and other relevant stakeholders in the disaster management cycle and society's security and resilience, to enable them to collaborate, exchange experiences and build synergies among them and with other European research/academic institutions and industry. The identification of practitioners' and attract their support is an essential part of the pre-standardization processes and harmonisations of semantics, where KEM will play an essential role.

**UMU** is an active member of different standard bodies and committees directly related to communication networks and cybersecurity. UMU is collaborating in different WGs of the European Cyber Security Organisation (ECISO), such as WG6 where active collaboration in the technical papers is expected; as well as WG3 on sectorial demand, where it is expected the participation in project meetings focusing on cyber capacity building and business development, especially regarding situational awareness approaches like the one proposed in VALKYRIES. Some other communities will also be outreached based on project results such as the Internet Research Task Force (IRTF) and the Internet Engineering Task Force (IETF), where UMU is quite active in different working groups, with the participation and production of Internet drafts and RFCs. Finally, the close relation with ITU-T, especially with the ITU-T Study Group 17 on Security, will also help to promote VALKYRIES results into this important standardization body.

**SSA** will develop a set of minimum common regulatory requirements and recommendations for policymakers and stakeholders relevant to the development of innovative standardisation/certification solutions for disaster management, with a focus on data protection and IP law. In particular, it will assess the needs regarding technology and data standardisation in the realm of crisis management and find adequate regulatory solutions in consistency with the protection of data subjects' fundamental right to data protection and businesses' intellectual property rights over relevant data and processing infrastructure. Additionally, SSA will identify all relevant Ethical Legal and Societal Aspects (ELSA), including privacy, autonomy/freedom of choice/expression, non-discrimination, copyright, tort, contract law and their interplay with cross-sector law, land law, and regulations, with a focus on the aspects related to cross-border situations. SSA will regularly engage VALKYRIES partners in the regulation activities deriving from the project development. The know-how developed along with the DaMP will create the premises for a start-up to be a spin-off of SSA for its exploitation.

**BDI** is the structure of the Bulgarian MoD responsible for the development, coordination, approval, registration, distribution, storage and update of military standardization documents. Besides, BDI organises and coordinates the process of ratification, approval, and implementation of NATO standardization documents and maintains standard information system. Also, BDI coordinates the cooperation in the field of military standardization within NATO, EU and on bilateral basis. One of the directorates of BDI, "Military Standardization, Quality and Certification" will support the research activities in the standardisation domain of the VALKYRIES project based on the strong background in standardization processes.

**USN** is focusing its activity on technology for maritime operations like navigation, autonomy, communication and similar areas. USN closely cooperates with maritime authorities nationally as well as internationally and it will be with their collaboration and support that USN will be having direct access to standardization and regulation authorities, especially regarding the mission described in UC#4 in a cross-sector and Norway-Holland cross-border scenario.

### 2.2.3. Knowledge management and protection plan

The VALKYRIES Consortium strategy for knowledge management and protection concerns particularly ownership of intellectual property rights (IPR), access rights to any background and foreground IP for the execution of the project, and the protection of IPR and confidential information before the project starts. To facilitate reaching an agreement, the basic principles have been defined in the proposal, summarised in the following section. Details of VALKYRIES' strategy for knowledge management and protection will be defined in the Consortium Agreement and, as far as dissemination and exploitation of knowledge is concerned, in deliverables Data Management Plan (D1.3), Exploitation Plan (D3.6), Dynamic Harmonization and Standardization (D2.5), Business Cases (D3.5). The Consortium Agreement will be based on the MCARD-2020 model Consortium Agreement [DEM18] by Digital Europe and will be signed by all partners before the project starts.

**IPR management.** The management of IPR topics between the VALKYRIES Consortium will be tracked by the Innovation & IPR Manager (IM). The respective partners will establish intellectual property at Work Package level. The use of the IPR Helpdesk ([www.ipr-helpdesk.org](http://www.ipr-helpdesk.org)) will be promoted to help individual participants and partners with questions related to the protection of IPR. A procedure will be established to inform all other partners in the project in advance when the results of the project will be made public (e.g., in a conference paper). This allows partners to protect IPR before publication. Task T1.4 "Dissemination strategy" will maintain a record of all related documents and discussions. This can later be used as a basis for resolving conflicts related to IPR filings by partners. This procedure ensures that IPR questions will be managed in the interest of all partners.

**Access rights to background and foreground IP.** To ensure smooth project execution, partners agree to grant each other royalty-free access rights to their background and foreground IP for executing the project.



The Consortium Agreement will define details concerning these rights after the project to background/foreground IP.

**IPR ownership.** Foreground IP shall be owned by the respective Consortium's partners whose employee(s) generated it, or on whose behalf it was generated. Details of the project's legal framework related to the work, IP ownership, access rights for the project duration and other matters of the Consortium's interest will be defined in the Consortium Agreement to be signed by all partners before the project start. In some cases, where joint IPR ownership is envisaged, partners involved will explore the potential for a joint venture.

## 2.2.4. Communication activities

Communication is central for implementing the VALKYRIES dissemination and exploitation plan and for achieving the expected impact. The Consortium will perform the required communication activities to meet this purpose. To do that effectively, VALKYRIES will follow the communication approach defined below.

**Communication approach:** The following goals will guide the communication activities of VALKYRIES:

1. **Communicate the benefits of the project results**, including their strong potential business impact in the creative industries sector, clearly and effectively.
2. **Establish a two-way communication with the target audiences** defined in Section 2.2.1. The Consortium aims to get feedback from target audiences, mainly from potential end-users, in an open dialogue to ensure a transparent, interactive research and innovation process that will lead to a strong global market impact.
3. **Foster the uptake of the VALKYRIES results** and their further use by the target business users.

These goals will be achieved through a mix of communication activities that will be guided by two main principles: a) their effectiveness in reaching the target audiences; b) their return on investment and cost-effectiveness regarding the expected impacts. For implementing these principles, VALKYRIES will pursue a dynamic communication planning approach based on KPIs and target values. VALKYRIES' communication activities include the promotion of the VALKYRIES concepts and results through inter-project concertation, scientific publications, workshops, industry booths at significant events, as well as the project's Web Portal and complementary social media activities. VALKYRIES will be proactively communicating with target audiences in the EU and beyond from the outset of the project.

**Overview on communication activities for different target audiences:** VALKYRIES will implement a cost-effective mix of activities to reach its target audiences in a way that meets their needs, see Table below.

Activity	Description	Expected impact	Audience	KPIs
<b>Design logo and presentation templates</b>	Professional logo. Professional presentation template to be used by partners.	Visual identity and branding of the project; unified experience for the targeted audience.	All target audience groups.	Logo and templates available in professional quality by M2.
<b>Project factsheet</b>	Double-sided A4 page containing basic information on the project.	Provision of instant information about the project.		500 readers reached.
<b>Project website</b>	A website, providing information about the project, the demos and the results to target audiences.	Main online information point; communication of project news, events results; liaisons with other initiatives, projects through links.		An average of 200 viewers per month across 24 months.
<b>Social Media channels</b>	Regular sharing of news on activities and results as well as interaction with target audiences via social media.	Increasing visibility to stakeholders; direct communication mechanism between social media users and Consortium.		>200 followers on Twitter; 20 tweets and 10 retweets per month.
<b>White papers</b>	Posters/banners to present the project's concept; Flyers with general project information; ad-hoc information at selected events.	Communication of results and information provision at events; ad-hoc diffusion of information based on identified opportunities.	End-users, Practitioners and institutions for regulation and standardization	2,000 readers reached via printed and electronic copies.
<b>Joint events, workshops, round tables</b>	Events co-organised with targeted stakeholders or where VALKYRIES will be invited to present its work and vision.	Information exchange and dissemination; increase awareness.		500 participants reached in total over 24 months.

<b>Demonstrations, show cases, exhibitions</b>	Events where VALKYRIES will communicate its results through demonstrations.	Attraction of target audiences and making them aware of the VALKYRIES solutions' benefits.		2,000 visitors reached in total over 36 months.
<b>Demonstration workshops</b>	Three demonstration workshops in M6/M12/M24 will be organised.	Information exchange, dissemination; awareness.		30 participants per workshop.

### 3. IMPLEMENTATION

#### 3.1. Work Plan

##### 3.1.1. Overall strategy of the work plan

VALKYRIES is scheduled to last for **2 years** and the work has been split into seven Work Packages (WP), directly associated with the overall project objectives identified in Section **¡Error! No se encuentra el origen de la referencia.** and the project development methodology of Section **¡Error! No se encuentra el origen de la referencia.**. The work plan definition follows an analysis of the interdisciplinary environment of the project, considering methodological, procedural, ethical, legal, social, economic and technical challenges. To this end, straightforward project development will be guided in the grounds of the **WP1 Project Management and Communication**, which is in charge of the VALKYRIES Governance, Technical/Scientific Management, quality of assurance, regulatory compliance and defining and enforcing the project Communication and Dissemination strategies. This will be a cross-cutting WP that extends over the complete VALKYRIES development life cycle. In parallel, two WPs will embrace the design principles and guidance for the expected normalization actions: **WP2 Design Principles and harmonization Tactics**, and **WP3 Responsible innovation, certification and exploitation**. The first will settle the system requirements, scope of the demonstrators, joint terminology and semantics, overarching architecture of the SIGRUN platform; and while define and implement the VALKYRIES harmonization methodology and standardization plans. Alternatively, WP3 will cover the analysis of the ethical, legal and socio-ethical opportunities, maps, roadmaps and tools; the project activities concerning the improvement of the sectorial certification and accreditation capabilities; and the definition and enforcement of the Sustainable exploitation and commercial plans.

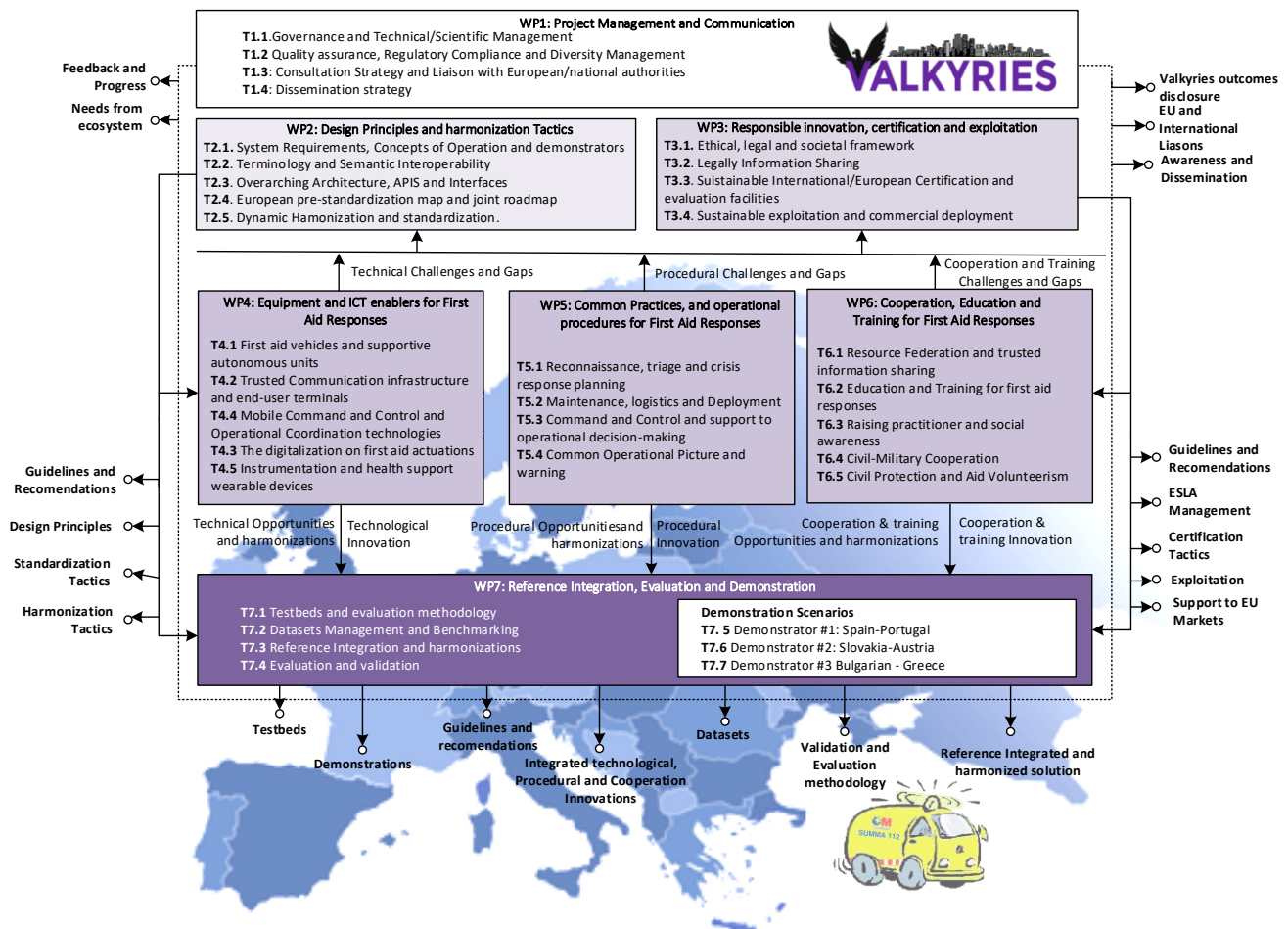


Figure 6: VALKYRIES project flow and interdependencies between WPs

On the other hand, the core working blocks of the project will be embraced by **WP4 Equipment and ICT enablers for First Aid Responses**, **WP5 Common Practices**, and **operational procedures for First Aid Responses**, and **WP6 Cooperation, Education and Training for First Aid Responses**. They will identify the opportunities on their studying streams, reveal normalization gaps, propose EU-level capacitation roadmaps and conduct local reference integrations on a set of selected solutions able to fit the agreed requirements for the reference integration. Finally, **WP7 Reference Integration, Evaluation and Demonstration** will reference integrate these solutions building the SIGRUN platform for joint communications and information sharing on crowdsourced first aid C&C in multi-casualty disasters. This WP will also cover the definition of a suitable evaluation methodology, testbeds, datasets, and execution and report of the four project demonstrations.

The VALKYRIES WB detailed in **Figure 6** also includes the work packages and tasks defined in this section as a Pert diagram, describing their relationships and dependencies when achieving related activities and taking into consideration the Gantt chart of **Figure 7** with the duration in time of WPs and times as well as the delivery date of deliverables. Accordingly, all the project activities are supported by coordination actions and communication and exploitations actions (WP1). The project design principles, standardization and harmonization outcomes (WP2), and the project certification and exploitation actions (WP3) will feed the technological (WP4), procedural (WP5) and collaborative (WP6) working streams. The outcomes of these streams will converge in the VALKYRIES reference integrated platform (SIGRUN), evaluation and demonstration actions (WP7).

### 3.1.2. Timing of the activities (Gantt chart)

The Gantt chart is illustrated in **Figure 7**, which depicts the timing of the project activities. A detailed description of each WP and task is detailed in Section 3.1.3 to follow. The chart also includes the project deliverables and milestones, a description of which can be found in Section 3.2.2, and where interdependencies of the VALKYRIES components are also shown in the Pert chart outlined in **Figure 6**.

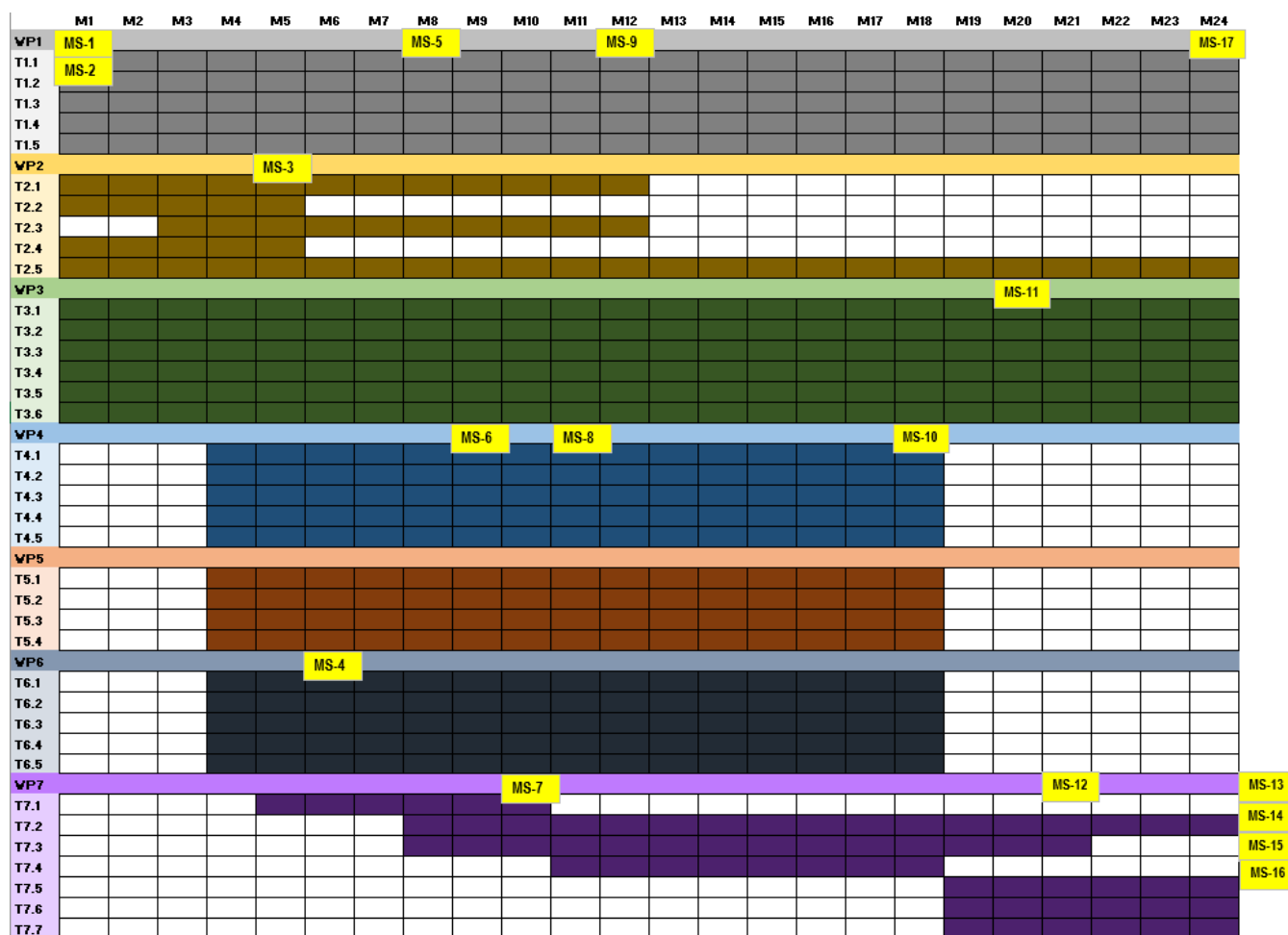


Figure 7: VALKYRIES Timeline

## 3.2. Management structure and procedures

Best practices from numerous European collaborative projects show that the best results can be achieved if the Consortium partners consider their involvement and investment in the project in a similar way as they might engage in comparable business projects, where the primary challenge of project management is to ensure achievement of defined project objectives. However, the geographically distributed nature and the temporary nature of EU projects stands in contrast to usual business operations. We must deal with Consortium members of different cultural and professional backgrounds as well as with people from various legal entities applying different internal principles for work organisation. Furthermore, leaders of the EU projects are in a particular situation, where they do not have direct control over the involved personnel and no formal authority towards Consortium partners' organisations. Therefore, team building among the variety of partners and achievement of trusted collaboration among them are essential for successful project implementation. On the other hand, a collaborative project also requires efficient and flexible management procedures as well as a well-structured project organisation, to ensure the division of responsibilities among the partners as needed for the project, clearly defined decision making and self-assessment processes, proper information flow in the Consortium, and communication towards EC and broad public. The project management structure and procedures, described in detail below, will be implemented in the scope of WP1, providing necessary resources for all related activities.

### 3.2.1. Project organisation

The management structure, as shown in Figure 8 consists of the Council of Partners (CoP), Project Steering Team (PST) and Work Package Leaders (WPL), all of them supported by an External Advisory Board (EAB), an Ethics Panel and Innovation & Commercialisation Board (I&CB). Each partner has a clearly defined technical, validation or management role. The PST will focus on Consortium management issues, including Quality Assurance (QA), Consortium Agreement (CA), roles and responsibilities, audit certificates, ethics, gender issues, societal questions and liaison with third parties and the EU. The related management functions, roles and procedures are described in detail below and are part of the CA.



Figure 8: Project management structure

The management structure of VALKYRIES has been designed to:

- Ensure that the project meets its contractual obligations. It will entail continuous progress monitoring, managed by Project Coordinator, communication and a shared understanding of roles and responsibilities.
- Facilitate the delivery of high-quality innovation. Central to achieving this will be the coordination of the activities of the technical partners and the integration of their results.
- Maximise, measure and validate the impact of the system on the target audiences, both within and beyond the technology-enhanced learning research and industry communities.

**Council of Partners (CoP):** Chaired by the *Project Coordinator (PC)*, the CoP is the main decision authority for the Consortium, which includes representatives from each and every partner, having the authority to make



decisions on behalf of their respective organisations in terms of overall strategy and resources allocated to the project. The CoP appoints the EAB, *Ethics Panel and I&CB* members and chairs. The meeting agenda includes: (a) report by the PC, (b) report by the Quality Assurance & Risks Manager on quality and risks issues, (c) reports by WP Leaders on technical implementation issues, (d) approval of annual and final reports, (e) approval of yearly implementation plans, and (f) decisions on specific items. The council of partners has the following chairs: Project Coordinator, Technical Coordinator, Quality and Risk Manager, Communication Manager, Demonstration Manager, Ethics and Legal Coordination, Cross-sectorial Cooperation Manager, and Standardization Manager. The main project management roles and responsibilities are summarised below. The short biography of personnel named are listed in Section 4, verifying their competence in leading these roles.

<b>Project Coordinator (PC):</b> Juan Román Martínez Arranz (IND)
Ensure efficient communication between partners and with the EU and mediate any conflict as necessary. As chair of the CoP and PST, be responsible for the integrative, cross-disciplinary issues of the project, for planning and monitoring progress and implement any necessary corrective measures. Ensure final reports submitted to the EU by the PMg are complete and accurate. In the event of a WP giving an unexpected result, flag the issue to the CoP, which will determine the appropriate course of action. Endeavor to maintain team motivation, encourage creativity among the project team, and ensure that corrective actions are taken as necessary. The PC will follow up the project status and continuously check progress against schedule and budget, if milestones are met and deliverables adequately produced. It will also submit deliverables, produce agenda, minutes for the PST and CoP meetings; ultimately, it will manage the information flows between partners and organise resolution procedures.
<b>Technical Manager (TM):</b> Jorge Maestre Vidal (IND)
The TM will guide and monitor the technical progress of the project. He will conduct a technical assessment of completed and running activities as well as drafting reports to CoP. In strong collaboration with IM and the EAB, the TM aligns technical direction with innovation strategies and establishes and maintains the VALKYRIES design specifications and platform. He also monitors the preparation of technical deliverables and identifies trends and technologies.
<b>Quality Assurance &amp; Risks Manager (QRM):</b> Gregorio Martínez Pérez (UMU)
Develops and supervises quality plan, risk assessment and implementation of mitigation measures, ensures high-quality deliverables and thoroughly tested and reliable solutions. He also chairs quality reviews. The PST's member reports to CoP Performs project quality checks, risk assessment and monitoring. He performs QA project reviews, evaluation measurements and produces quality reports. Supervises implementation of the quality plan; organises and supervises quality review/peer reviews for all deliverables; signs all deliverables; alerts CoP to any quality issues.
<b>Dissemination &amp; Communication Manager (D&amp;CM):</b> Vassiliki Varela (KEM)
Leads the dissemination and communication (D&C) activities and is also Responsible for defining the D&C strategy and coordinating the D&C activities.
<b>Ethics Manager (EthM):</b> Giovanni Comandé (SSA)
Leads the project's ethics and monitors the objectives and implications of VALKYRIES, to ensure that it conforms to the highest ethical standards. The PST's member reports to the CoP. The EthM will guide partners in their work and provide input regarding ethics in all activities involving research with humans, dealing with the Ethical Panel members and involving the needed experts for each task.
<b>Innovation &amp; IPR Manager (IM):</b> Giovanni Comandé (SSA)
Leads the Innovation & IPR activities that identify and manage the innovation and IP from the project and for the planning and the monitoring of all key innovation tasks. PST Member reports to the CoP, advises the partners on the scope and potential of the innovations arising and pays attention to discerning IP at regular checkpoints. He identifies trends and technologies that could be of interest to the project and is responsible for the creation of the Innovation progress reports for the EAB and the I&CB. The IM will be responsible of promoting the adoption of VALKYRIES' outcomes by end-users; identifying potential adopters and designing the overall go-to-market strategy and commercialisation actions. As a member of the PST he reports to the CoP. In strong collaboration with the IM, EAB and I&CB, he is responsible for all activities towards market take-up, including showcases and VALKYRIES branding. He also checks business/exploitation objectives progress and performs business risk management. He leads the market assessment, feasibility study, revenue planning, business model and roadmap.
<b>Demonstrations Coordinator (DM):</b> Galya Terzieva (ISEMI)

Responsible of the management of the UCs, including the coordination between them and between the different partners from different countries. The DM will ensure that the preparation, planification, execution, result and post analysis covering all the requirements and the expected conclusions, conducts to an improvement over the current processes on a disaster response.
<b>Cross-Sectorial Cooperation Manager (CsCM): Nikolai Stoianov (BDI)</b>
Responsible for guaranteeing the transfer and coordination between military and civil elements of the proposal. To do that (BDI) will guide the proper implementation of the project Consultation Strategy and Communication plans concerning the engagement and collaboration between VALKYRIES, first-aid responders, Civilian Protection, volunteering platforms military institutions and other stakeholders (industry, RTOs, etc.)
<b>Standardization Manager (SM): Angel Gimenez (NOVOTEC)</b>
Responsible for elaborating and coordinate the standardization process in the proposal. SM will guide all the standardization processes, including the features of the standard, starting conditions, possible interfaces with other standards, activities to be done within the standard and execution paths. The SM will inform of the proposed standards and how to join them.
<b>WP Leaders:</b> Juan Román Martínez (IND, WP1), Angel Giménez (NOVOTEC, WP2), Giovanni Comandé (SSA, WP3), Gregorio Martinez Perez (UMU, WP4), Alberto Montarelo (TAS, WP5), Nikolai Stoianov (BDI, WP6), Galya Terzieva (ISEMI, WP7)
The leader of a given WP from WP1 to WP7 reports to the PM and produces detailed work plans and progress reports, also safeguarding the timely and effective execution of the WP work and that deliverables meet the quality standards. It will also review the results of the WP, point out any underperformance and provide information for management reports in the PST.

**Project Steering Team (PST):** The PST consists of the managers of the project, as listed below, who bring a wealth of experience in coordinating EU projects. The PST ensures that the project will achieve its objectives and satisfy the needs of the EC, the Consortium and VALKYRIES industries.

**External Advisory Board (EAB):** The EAB will offer impartial scientific advice, support the PST and advise the Consortium on social, environmental, technological, legal and economic factors that may influence the innovation management of VALKYRIES. It will be chaired by one of its members, elected upon the EAB's first meeting in M1. All of them comprises the structure of external advisors representing research and business interests.

The following persons have confirmed their interest in and willingness to participate in the VALKYRIES EAB through Letters of Support provided in Annex 2. Additional EAB members may be invited if their mandates, objectives and activities fall in line with the objectives of the call and the aim of this proposal: <b>Juan de Dios Pastor.</b> CEO of CSA Ambulances (Spain); <b>Jose Ignacio Garrote.</b> Technical Manager of the ELIANCE (Spain); <b>Xiaoya Yang.</b> Counsellor of ITU-T Study Group 17 – Security, ITU-TSB (Switzerland); <b>José Rodriguez Gomez.</b> Medical Coordinator Centro Coordinador de Urgencias y Emergencias 112 de Extremadura (Spain); <b>Panagiotis TZiovaras.</b> Chief of Staff Hellenic Police (Greece); <b>Eduardo Montero Viñuales.</b> Director of Development and Communication. Falck VL Servicios Sanitarios (Spain); <b>Konstantin Zografov.</b> President de ACFEA Sofia Chapter (Bulgaria); and <b>René Peralta.</b> Computer Security División. National Institute of Standards and Technologies (US).
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Additional EAB members may be invited if their mandates, objectives and activities fall in line with the objectives of the call and the aim of this proposal.

**Ethics Panel:** Chaired by the Ethics Manager and may include the legal advisors of the partners involved in each sensitive task (i.e., experts on ethics, privacy, and legal issues such as the data protection officers of the involved partners). An external expert will be invited to the panel, to act as an independent reviewer to ensure decisions taken can be fair, transparent, neutral, generalised, and adoptable by wider audiences.

**Innovation & Commercialisation Board:** The I&CB, chaired by ILS, includes a member from each organisation participating in the PST. Its role is to detail the commercialisation strategy.

### 3.2.2. Progress reporting

**Internal** (within Consortium): Every beneficiary commits management reports to the Project Coordinator (PC) each 6 months. They will describe the technical and management project work done, listing effective time spent on the project, mention difficulties, milestones and deliverables (or contributions to deliverables in case of joint deliverables) that have been reached, publications, travel and visits. The PC will be able to track both overall budget burn rates, as well as identify potential problems with individual organisations as a result of this report. **External** (to EC): The PC will coordinate, consolidate and submit to the EC the periodic and final reports, deliverables and Form C financial reports as needed.

**Project communications and meetings:** The Consortium recognises that a vital contributing factor towards the successful management of a project, is effective communication. A kick-off meeting is planned in M1. PST face-to-face project meetings will be convened every four months. CoP meetings and PST meetings will coincide in time, in which case the day before the CoP meeting, PST members will gather to present an overview and table any critical decisions that are needed to be taken at the CoP. Additional cross-team, meetings at WP level, and face-to-face meetings will be organised when necessary, and teleconferences will be arranged at much frequent time intervals, as needed. Thus, in total five face-to-face PST/CoP meetings (i.e., in M1, M4, M6, M8, M12, M16, M18, M22, M24) are anticipated. They may occur each four project development months (M1, M4, M8, M12, M16, M20, M24), but extraordinary agile meetings will be scheduled aligned with the VALKYRIES Workshops, and VALKYRIES Ethical, Legal and Standardization Workshops (M6, M12, M18, M24). EAB meetings will occur in VALKYRIES coinciding with the relevant CoP meetings. Day to day communications will primarily use email and VoIP/WebEx/GoToMeeting web conference tools. A project mailing list will be established; WP leaders may also set up their distribution lists. Contact (email, phone and mail) details for all personnel involved in the project will be available on the private section of the project web, where information, ideas and documents will be shared.

**Consortium Agreement:** A Consortium Agreement (CA) will be concluded between all members of the Consortium, as dictated by EU rules, to the signature of the Grant Agreement (GA). The CA will be based on the agreement developed by the 'Development of a Simplified Consortium Agreement' (DESCA 2020) group, which is a comprehensive, modular CA designed explicitly for projects within the EU Horizon 2020 Programme. The CA will supplement the Description of Action, covering topics that are important for the delivery of the project and the management of knowledge between partners, but are not specific to the Consortium's contract with the EC.

**Decision-making mechanisms and conflict resolution:** In the course of the project, the Consortium will have to agree on and develop technical, scientific and commercial ideas and specifications. Most decisions about the work to be carried out have been made at proposal and so will be subject to the GA signed with the EC. Decision making will strive for consensus: agreement will usually be reached, followed by official confirmation via electronic mail, letter or agreed written minutes. For important issues, the agreement may take the form of a short report that needs to be signed by those responsible for decision-making. Conflict prevention techniques will be used to avoid problems in decision-making. Where consensus cannot be reached, conflict resolution procedures will be actioned. The specific personnel roles and committees described above will resolve and/or implement the necessary actions, according to the following process: 1) they will first be addressed within the relevant WP through discussion chaired by the WP leader; 2) if this fails, the issue will be presented by the WP leader either to the PMg, TM or the CoP depending on the nature of the problem (i.e., administrative, technical or business/strategic); 3) the relevant board will resolve the issue through a majority vote, with the board chair holding a casting vote. The EAB will be involved in case of high-level scientific disputes; 4) conflicts that cannot be resolved through those principles will be mediated by an external expert in view of reaching consensus, and 5), as a last resort, disputes will be handled according to the dispute resolution provision outlined in the CA.

### 3.2.3. Innovation Manager

The Innovation & IPR Manager will be responsible for Innovation management. Specific measures to engender an innovation culture will be: i) project meetings including sessions on emerging technologies/approaches to generate novel ideas for research and to ensure applied knowledge transfer to our industrial partners, and inform future research decisions; and ii) in close collaboration with the Commercialisation Manager to foster a commercialisation culture among group members to maximise the identification, assessment and execution of opportunities to deliver impact from research outputs. Besides,



the EAB will be responsible for continuous review of the research progress, being provided with reports at 6-month intervals from the CoP, to identify new opportunities for innovation, grow the engagement with our industrial partners, and seek opportunities for new collaborations.

### 3.3. Consortium as a whole



The VALKYRIES Consortium is composed by 19 participants (including two third parties) from 8 European countries that complete a group with complementary areas of expertise, all oriented to achieve the project objectives. The partners for VALKYRIES were carefully selected to have all complementary skills expected to adequately cover the objectives and activities demanded by the project, to achieve the aimed results and impacts. By clustering the different partners by technological areas of expertise, the different partners include SMEs, large enterprise companies, end-users as well as universities and scientific research centres. Distributed through the

European geography but still very well-connected as most of the partners have past working experience in the same Consortium and/or related in the past.

#### 3.3.1. Complementary expertise knowledge of the VALKYRIES Consortium

As depicted in the table below, the VALKYRIES Consortium has been carefully selected with the aim of sharing the project's vision and objectives while fulfilling the required expertise knowledge to undertake the responsibilities described in this ambitious proposal. End-users and practitioners and critical infrastructure operators (SMS, BDI, BRC, HESE, AREU, USN, HRT) have been carefully selected to guide and exploit the VALKYRIES harmonization and innovation outcomes, which will support the demonstrations of the project results in the four cross-border demonstrators. On the other hand, the industry (IND, NOVOTEC) and SME partners (TAS, PARTICLE, BLC, ARA) will lead the technology deployments to enhance their products with the VALKYRIES innovative results, as well as gaining a strong competitive advantage in the market. Finally, the selected RTOs (UMU, SSA, ISEMI, KEM) will be in charge of leading the technology development to enhance their current existing proofs-of-concept and portfolios with the VALKYRIES results.

Expertise (VALKYRIES Functional Blocks)	Partner																	
	IND	SMS	TAS	ISEMI	PARTICLE	UMU	SSA	NOVOTEC	BLC	BRC	BDI	KEM	HESE	ARA	USN	AREU	HRT	
Perception	X	X	X	X	X	X	X	X	X		X		X	X		X	X	
Aggregation and data fusion	X					X	X	X	X		X	X	X	X	X			
Ethics and Regulation	X	X	X				X	X		X	X	X	X		X		X	
Pre-standardisation & Standardisation	X		X		X		X	X				X	X		X			
Certification	X		X				X	X			X		X		X			
Harmonisation	X	X	X	X	X		X	X		X	X	X	X	X	X		X	
Technologies and Equipment	X	X	X		X	X	X		X		X	X	X		X	X	X	
Common Practices and Operational Procedures	X	X	X	X	X	X	X			X	X	X	X	X		X	X	
Cooperation and resource federation	X	X	X	X	X	X	X		X	X			X			X	X	

Education and Training	X	X	X	X			X			X	X	X	X		X	X	X
Reference Integration	X				X	X						X	X	X	X		

### 3.4. Resources to be committed


The realisation of the VALKYRIES objectives requires investments in human resources (person-months, PM) and other costs such as equipment, consumables, travel costs, etc. In summary, the total EU requested contribution is **€5,995,757.50**. The direct allocation of human resources to the overall project corresponds to **1036.5 PMs**. The following table illustrates an analytical distribution of PMs in work packages as well as the partners involved, highlighting which of them is leading each work package, well-balanced to achieve the objectives proposed.

## 4. MEMBERS OF THE CONSORTIUM

Participant No	Participant organisation name	Part. short name	Country
1 (Coordinator)	INDRA SISTEMAS S.A.	IND	Spain
2	SERVICIO DE URGENCIAS Y EMERGENCIAS DE LA COMUNIDAD DE MADRID (SUMMA112)	SMS	Spain
3	TASSICA EMERGENCY, TRAINING & RESEARCH S.A.	TAS	Spain
4	INTERNATIONAL SECURITY AND EMERGENCY MANAGEMENT INSTITUTE	ISEMI	Slovakia
5	PARTICLE SUMMARY	PARTICLE	Portugal
6	UNIVERSIDAD DE MURCIA	UMU	Spain
7	SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO S ANNA	SSA	Italy
8	NOVOTEC CONSULTORES S.A.	NOVOTEC	Spain
9	BLOCKCHAIN2050 BV	BLC	Netherlands
10	BULGARIAN DEFENCE INSTITUTE	BDI	Bulgaria
11	BULGARIAN RED CROSS	BRC	Bulgaria
12	KENTRO MELETON ASFALIAS	KEM	Greece
13	HOSPITAL DO ESPIRITO SANTO ÉVORA	HESE	Portugal
14	ARATOS.NET LTD	ARA	Greece
15	UNIVERSITY OF SOUTH-EASTERN NORWAY	USN	Norway
16	AZIENDA REGIONALE EMERGENZA URGENZA	AREU	Italy
17	HELLENIC RESCUE TEAM	HRT	Greece
<b>Linked Third Parties</b>			
18	FUNDACIÓN PARA LA INVESTIGACIÓN E INNOVACIÓN BIOMÉDICA EN ATENCIÓN PRIMARIA	SER	Spain
19	INDRA FACTORIA TECNOLOGICA SAU	IFT	Spain

## 4.1. Participants

### 4.1.1. INDRA SISTEMAS S.A.

<b>Partner Full Name</b>	<b>Indra Sistemas S.A.</b>		
<b>Short Name</b>	IND	<b>Country</b>	Spain
<b>Type</b>	Large Company	<b>Website</b>	<a href="https://www.indracompany.com">https://www.indracompany.com</a>
<b>Official Logo</b>			
			
<b>Brief Partner Profile</b>			
<p>Indra is one of the main global consulting and technology companies and the technological partner for the key operations of its clients' businesses throughout the world. It offers a comprehensive range of proprietary solutions and cutting-edge services with optimal technological capabilities, supported by a corporate culture of reliability, flexibility and adapting to client requirements. Indra is a world leader in the development of comprehensive technological solutions in fields such as Defense &amp; Security, Transport &amp; Traffic, Energy and Industry, Telecommunications &amp; Media, Financial Services and Public Administrations &amp; Healthcare. Through its Digital Labs unit, it addresses the challenges posed by digital transformation. In 2018 it posted revenues of 3104 million euros and had 43000 employees, a local presence in 46 countries and projects in more than 140 countries around the World.</p>			
<b>Role in Project</b>			
<p>Indra will be the Project Coordinator of VALKYRIES and will lead the WP1 "Project Management". Indra will actively participate in the VALKYRIES' project incorporating all its experience in the design of standardization and harmonization principles; own solutions in simulation, decision making, mission planning, risk identification and management to serve as starting point in the research of the state of the art of solutions for first responders; and will put at the service of the consortium a Testbed in which to develop the kinetic part of the demonstrators. Indra will actively disseminate the project results and participate in different national and international fairs, forums, exhibitions and events. Beyond its role in the project governance and dissemination plans, Indra will specifically contribute to the following VALKYRIES activities:</p> <ul style="list-style-type: none"> <li>• As key participant in WP2, Indra will lead the definition of the project requirements and scope of the demonstrators (T2.1); taking part in the agreement join terminology a semantics (T2.2), and contributing to the planning of the reference integration architecture (T2.3)</li> <li>• Indra will contribute to identification of ethical-legal gaps (T3.1) and the VALKYRIES contributions for a sustainable certification/ccreditation (T3.5). Indra will lead the related research in the shake of interoperability (T3.2)</li> <li>• Indra will lead the definition of the VALKYRIES Exploitation plan and its enforcement (T3.6).</li> <li>• Indra will contribute to the technological working streams related with trusted BLOS communications (T4.2) and remote sensing as support to first aid instrumentation (T4.5). Indra will lead the streams related with command and control (T4.3) and the digitalization of the first aid sector (T4.4) Indra will contribute to the procedural studying streams towards harmonizing Command and Control (T5.3) and the acquisition of a Common Operational Picture and warning (T5.4)</li> <li>• Indra will contribute in all the task focalized in Cooperation, Education and Training for First Aid Responses (WP6)</li> <li>• Indra will contribute to the SIGRUN refence integration (T7.3) and in all the demonstrations.</li> <li>• Indra will lead the activities for validate, verify and evaluate the project outcomes (T7.4)</li> <li>• Indra will contribute to de definition of a suitable evaluation methodology (T7.1) and the collection of the needed datasets (T7.2)).</li> </ul>			
<b>Relative Expertise / Experience</b>			

Field of expertise	Description of the expertise or experience related to this expertise	Added-value for the project
<b>Defence Systems</b>	Indra offers an integrated air defence solution, which enables appropriate actions to be planned and managed to guarantee surveillance and control of air space. The systems designed and manufactured by Indra include: 3D radars for monitoring air space, command and control systems and the design and integration of complex communications systems suited to the client's specific.	The Indra's solutions developing, maintaining and customizing surveillance, radar and command and control, etc. with s strong familiarization with their related certifications, standards, regulations. Indra is part of their supply chain, which a clear understanding of these products life cycles and exploitations.
<b>Security</b>	Indra's offer allows military or civilian public and private organisations to identify threats before they materialise, prevent them from happening and protect infrastructure to avoid damage. Indra supplies technology and solutions to combat all kinds of security threats: Border surveillance (C4ISR), Safe Cities, Critical infrastructure protection, Smart Borders, Secure Communication (COMSec)	Large expertise in collaboration with cross-sectorial collaborations on incident respond, surveillance, mission planning, command and control, and support to decision-making. In addition, Indra has a large network of related customers and collaborators thorough the world that may be attracted for external advising or/as tentative end-users.
<b>Simulation and Training</b>	Indra develops and delivers simulation solutions for training, for both the civilian and military markets, including mission, operation, and flight simulators and training centres, with the highest qualification levels. For over three decades, we have maintained our reputation as a leader in technology, having delivered systems for a wide range of solutions, including simulators for civilian and military planes, helicopters, terrestrial and naval vehicles and unmanned systems, among others.	The large portfolio of Indra's simulation capabilities will bring experience, but also background solutions that may support the VALKYRIES tasks related with simulation-based decision making, education and training. On the other hand, it is expected that some of these solutions complement de kinetic actions at the demonstrations by simulation, emulating and interconnecting digital/physical services and operations assets.
<b>Logistics and maintenance</b>	Integrated support for armed forces platforms and aircraft. We guarantee an optimal life cycle for the main defence technologies. Indra provides consultancy and technical support services to public and private bodies and industries in Integrated Logistics Systems (ILS) engineering and related engineering fields: Reliability, Maintainability, and Advice.	As experts in dual-usage logistics and maintenance, Indra will contribute to analyse and develop capabilities towards harmonizing the related procedures on assets of the EMS sector, like vehicles (ambulances), equipment or communication technologies, etc.
<b>Cyber defence</b>	Indra develops and delivers cyber situational awareness capabilities and cyber training solutions and courses adaptable to the customer profile: academy, military decision-makers, LEAs, first responders. These capabilities allow to infer and manage the propagation of cyber situations to other operational planes	This background and expertise will contribute to assure the secure and private by design paradigm adopted by the VALKYRIES methodology. Some solutions like Indra's Cyber Range will participate in the dataset generation tasks, and in the project education and training studies.

<b>Space</b>	Provide satellite terminals for naval and terrestrial applications, including man-pack equipment and SATCOM “on the move” (SOTM) and SATCOM “on the pause” (SOTP) terminals. We are also developing an airborne solution for the A400M and specific solutions for UAV, including the analysis of alternatives for integration in the controlled air space.	The expertise and background on Indra the remote sensing and other related applications will contribute to the VALKYRIES normalizations on the semantics and required common information. This will also contribute on the technological streams related with remote instrumentation and Geographic Information System (GIS).
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#### Key Personnel's CVs

**Juan – Román Martínez Arranz (male)** Juan – Román is Master in Computer Science by Universidad Politecnica de Madrid, Bachelor in Business Administration by Universidad Nacional de Educación a Distancia. He also is MSc in Contracts Management with the public Administrations by Universidad Nacional de Educacion a Distancia and Executive MBA by IE Business School. Beta Gamma Sigma: The International Business Honor Society. He is lifetime member of Beta Gamma Sigma that includes the top 5% of the best Business Schools in the world. Only the best students of these schools are invited to be part of Beta Gamma Sigma.

**Jorge Maestre Vidal (male)** is PhD. in Computer Science, and Senior Specialist in cyber defense at Indra, being part of its Digital Labs division. He is former member of the Department of Software Engineering and Artificial Intelligence (DISIA) of the Faculty of Computer Science and Engineering at the Complutense University of Madrid (UCM), Spain. In 2016 he was Visiting Research at Instituto de Telecomunicações (IT), Aveiro, Portugal. He is the Technical Coordinator of the Indra's solutions for Cyber Situational Awareness acquisition for supporting military decision-making, leading the related technical activities conducted on National and International innovation programmes, like the EDA projects Cyber Defence Situation Awareness Package – Rapid Research Prototype (CySAP-RRP) (EDA 16.CAT.OP.078.) or Generation of Data Sets for Validation of Cyber Defence Tools (Cat. B FC B-1508-GP); and the forthcoming European Cyber Situational Awareness Platform (ECYSAP, EDIDP-CSAMN-2019) and COBRA (COINCIDENTE 2019). He was recently participant in large scale European projects like SELFNET (H2020-ICT-2014- 2/671672), RAMSES (H2020-FCT-04-2015/700326) or CRYPTACUS (ICT COST Action IC1403); currently leading the Indra's Digital Lab technical participation in the Full Spectrum Situational Awareness (T-SHARK) programme of the SPARTA (H2020-FCT-2015/83089) project, and Indra's Principal Researcher of the forthcoming LeADs (MSCA-ITN-2020) Training Network. Among others, he recently collaborated with the 5G-PPP Security WG, the EDA's Cyber Defence Research and Technology (R&T) Ad Hoc Working Group (AHWG), and the NATO NIAGs SG-251 and SG-238. He is evaluator of Chilean National Fund for Scientific and Technological Development (FONDECYT).

**Daciana Bochis (female)** is PhD in Mathematics, senior manager of the Geospatial Unit and senior technical Manager in the AI Unit, being part of the Digital Labs division of Indra. She is a former member of the Simulation Department of Indra, being for more than 12 years Software Development manager in the Visual System Unit. She has participated in more than 20 Civil and Military International Simulators (Fixed and Rotary Wing Aircrafts, Ground vehicles, Machinery, etc.). She was conducting several R&D projects related to “Generation of 3D scenarios for Simulators” (CDTI). She is collaborator of the NIAG-SG238 WG, being part of the AI team. Her main research interests are in Computer Vision, Geospatial Information Systems and Artificial Intelligence applied to images.

**Marta Irene García Cid (female)** is a Technology Engineer and Researcher with a demonstrated history of working in the information technology, data management and analytics, focused in sustainability, platforms design and cyber & security technologies. Graduated from Complutense University of Madrid



(UCM), Spain, major in Theoretical Physics and master in Chemical Science and Technology from the same University. Skilled in computer simulations and business development.

**Margarita del Castillo Sancho (female)** is a Technology Strategy Analyst with a demonstrated history of working in the information technology and services industry focused in artificial intelligence, cyber & security technologies. Skilled in Business Development, Strategy Consulting and Customer Relationship Management. Graduated from Universidad Politécnica de Madrid, major in Telecommunications Engineering.

#### Relevant Publications, products, services

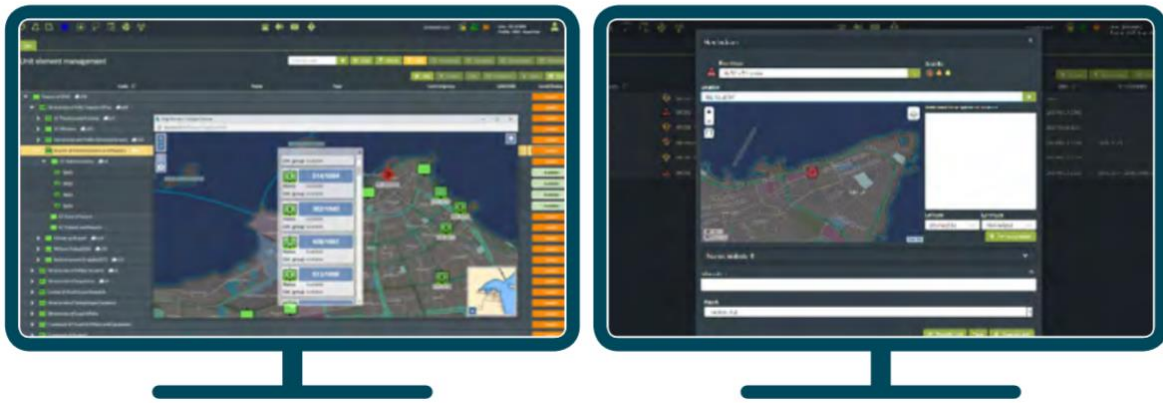
Some relevant publications in the last year:

- Jorge Maestre Vidal, Marco Antonio Sotelo Monge, "Denial of sustainability on military tactical clouds". Proceedings of the 15th International Conference on Availability, Reliability and Security, No. 4, pp. 1-9 2020
- Jorge Maestre Vidal, Marco Antonio Sotelo Monge, Sergio Mauricio Martínez Monterrubio, "EsPADA: Enhanced Payload Analyzer for malware Detection robust against Adversarial threats". Future Generation Computer Systems, Vol. 104, pp. 159-173, 2020
- Roumen Daton Medenou, Jorge Maestre Vidal, Gerardo Ramis de Riquelme, "CYSAS-S3: a novel dataset for validating cyber situational awareness related tools for supporting military operations". Proceedings of the 15th International Conference on Availability, Reliability and Security, No. 102, pp. 1-9, 2020
- David Sandoval Rodriguez-Bermejo, Ramis Pasqual de Riquelme, Jorge Maestre Vidal, "Evaluation methodology for mission-centric cyber situational awareness capabilities". Proceedings of the 15th International Conference on Availability, Reliability and Security, No. 101, pp 1-9, 2020.
- Jorge Maestre Vidal, Marco Antonio Sotelo Monge, "Obfuscation of Malicious Behaviors for Thwarting Masquerade Detection Systems Based on Locality Features", Vol. 20(7), 2020.
- Katherine Shirley Huancayo Ramos, Marco Antonio Sotelo Monge, Jorge Maestre Vidal, "Benchmark-Based Reference Model for Evaluating Botnet Detection Tools Driven by Traffic-Flow Analytics". Sensors, Vol. 20(16), 2020
- Jorge Maestre Vidal, Marco Antonio Sotelo Monge, Sergio Mauricio Martínez Monterrubio, "Anomaly-Based Intrusion Detection: Adapting to Present and Forthcoming Communication Environments". Handbook of Research on Machine and Deep Learning Applications for Cyber Security, IGI Global, 195-218, 2020.
- Marco Antonio Sotelo Monge, Jorge Maestre Vidal, Gregorio Martínez Pérez, "Detection of economic denial of sustainability (EDoS) threats in self-organizing networks", Computer Communications, 2019
- Marco Antonio Sotelo Monge, Andrés Herranz González, Borja Lorenzo Fernández, Diego Maestre Vidal, Guillermo Rius García, Jorge Maestre Vidal, "Traffic-flow analysis for source-side DDoS recognition on 5G environments", Journal of Network and Computer Applications, Vol. 136, pp. 114-131, 2019
- Marco Antonio Sotelo Monge, Jorge Maestre Vidal, "Framework for Anticipatory Self-Protective 5G Environments", International Conference on Availability, Reliability and Security (ARES), Canterbury, UK, 2019

Some relevant project and services:

- **EMERGENCY C4i CENTRE.** Indra provides information systems for disaster prevention, preparedness and response, giving an accurate and real time situation awareness to the agencies and stakeholders involved in the resolution of an emergency.
  - Joint decision making
  - GIS-based Common Relevant Operational Picture (CROP) is shared during the emergency
  - The activities are communicated across the entities using interoperable telecommunications networks
  - Real time access to information is possible with mobility solutions and collaborative portal





- **iSafety: Integrated Emergency Management System.** iSafety manages and facilitates the daily operations and decision-making, offering at every moment the best response options to each situation, assisting the operators and providing real time information. Among others provides: Multi-agency coordination and multi-center support, Emergency and crisis management, Latest IT standards.
- **Cyber Range (Product).** The Indra Digital Lab ´s Cyber Range platform is one of the most advanced cyber-entertainment solutions on the market. It has been designed to support intensive individual and group training in techniques and tactics related to cybersecurity, cyber attacks and forensic analysis. Cyber Range has been used in different CyberCamps organized by the Spanish National Cybersecurity Institute (INCIBE), Cyber Perseu (the National Cybersecurity Exercise promoted by the Portuguese Army), the CEPOL training course "Cross-Cutting aspects of cyberinvestigation - Cybercrime and cybersecurity" and the European Cyber Security Challenge, among many others.
- **CYSA: Cyber Situational Awareness platform (Product).** CYSA enables commanders and other decision-makers to have a clear understanding of the threat landscape to manage cyber risks during the planning and conduct phases of an operation. The outcome shall be a cyber-environment sufficiently benign to enable freedom of action in all the operation environments: maritime, land, air, space and cyber space. CYSA entails the following functional components:
  - An architectural framework consistent with the NATO Architecture Framework v3 and concurrent CSDP architectural products.
  - An accurate CIS infrastructure discovery component, which is needed for acquiring situational awareness regarding the own/friendly forces.
  - A threat management module able to match the intelligence product requirements with CONOPS requirements.
  - A cyber real-time sensor interface for efficiently acquiring situational awareness.
  - A dynamic risk management module able to evaluate the outputs of the previous three modules.
  - Cyber command and control (C2) enablers that include visualizations of the discovered threats, risks, and real-time situations
  - Decision support for cyber defensive actions, in this way assisting HQ decision-making.
  - Audition and self-protection capabilities.
  - Through life support capabilities
- **iMARE® Suite** is a system for the operation and management of logistics-port operations. Its aim is to meet the needs of the port manager / operator or the Port or Maritime Authority, as well as the stakeholders of its port community, including the integration of the multimodal logistics chain as a whole. The suite consists of four products, after more than 20 years of experience in the business, and that are presented in different integrations with each other, or with third-party components:
  - PCS. Automated process management among all public and private agents involved in the port's business operations as a multimodal logistics node.
  - PMIS. Help tools for the Port Authority, port manager / operator and other agents for managing scales.

- VTMISS. Control of maritime traffic from the integration of different sensors, of ships in the approach and internal movement of ships in the area of responsibility of the Maritime / Port Authority or in areas of high navigation density.
- FAMS. Access control and internal load movement; facilitate the optimization of processes in the terrestrial operation of load between access to port and load terminals to ship, and / or extension to the logistics chain in the hinterland.
- **IVictrix.** simulation platform is an innovative solution for supporting instruction, training and education in the field of shooting training, the result of the experience gained with the Victrix simulators. iVictrix interconnects different weapon simulation systems with the aim of carrying out continuous improvement of students, through the use of shared resources and tools to enhance and guarantee the operation of the platform:
  - iVictrix Analytics: training data analysis tool, display of evaluation performance indicators and use and maintenance statistics.
  - iVictrix Market: portal for sharing resources in real time between the different simulators (targets, exercises, scenarios...)
  - Victrix Engage: automation of logistics-related tasks through predictive analysis, automatic incident detection and stock control of the different simulator systems.
  - iVictrix Plan: planning manager for the exploitation activities of the different simulators as a whole (courses, maintenance, demonstrations, competitions...)
- **DÉDALO.** tactical room consists of a mobile panel system with recording cameras and audible, visual and tactical effects. It allows trainees to navigate potentially dangerous building entrances as well as hostile interior situations.
- **CESIHEL** Helicopter Simulation Centre: The Simulation Centre is strongly committed to enhancing the drivers' skills and increasing the level of training. It offers the possibility of carrying out daily missions in the most realistic scenarios, both civil and military, in the most adverse weather conditions and in any emergency situation. Operated by Indra under a special agreement with the Spanish Army, CESIHEL offers all types of pilot training: Ab initio, Type Rating, Recurrent, NOE, GVN Training, Tactical Missions; as well as initial and advanced maintenance courses for Cougar, Chinook and EC135. Indra, the leading Spanish technology company, began its journey in the simulation field in 1980, continuing to this day with more than 200 simulators delivered to more than 23 countries and 53 clients. Its experience in this field extends to naval and terrestrial simulation, offering solutions to our clients to increase training safety at an effective cost.



#### Relevant Projects / Activities / Initiatives

Some related project:

- **EDEN: Enduser driven DEMo for cbrNe:** The project aims at unifying all CBRNe intervention systems under a single interoperation standard. The main technological and functional innovation of the proposal lies in the integration of all the CBRNe tools under a single system in order to constitute a "Toolkit of toolkits" (ToT) that allows the user to select the most appropriate tools (HW, SW, procedures, etc.) to deal with the present threat. The challenge is therefore to ensure the interoperability of all these tools with each other.
- **G-SEXTANT: Service Provision of Geospatial Intelligence in EU External Actions Support:** The objective of G-SEXTANT is to develop pre-operational Earth observation services and products to meet the geospatial information needs of the European Union's external action and other users. These

products are designed to support humanitarian crisis situations, monitor conflict situations, detect illicit crops, and monitor borders, among other functions. G- SEXTANT will enable the improvement of existing services and products and the development of a standardised portfolio of solutions. The project is part of the European Copernicus Initiative (formerly known as GMES) in its Services for Security Applications-External Action line.

- **DEWI: Dependable Embedded Wireless Infrastructure:** DEWI aims to promote European leadership in the field of integrated wireless systems and mobile systems in intelligent environments such as vehicles, railways, aircraft and buildings. These environments include wireless sensor networks and wireless applications for citizens and professionals. The project includes the concept of a "sensor and communication bubble".
- **EVACUATE: A holistic, scenario-independent, situation-awareness and guidance system for sustaining the Active Evacuation Route for large crowds:** eVACUATE proposes a suite of technologies focused on the analysis and decision making, management and optimization of data in real time that aims to improve the front-end technologies of data collection installed in both mobile and fixed platforms, providing a flexible and complete coverage of the area affected by an event that requires mass mobilization; these data will be merged and analyzed to provide support for decision making in real time and make these resources available through the use of easily accessible web portals. This will provide significant support to citizens who are trying to evacuate complex sites and infrastructure, based on Information and Communication Technologies.
- **SINTONIA(Unmanned Systems Oriented to Zero Environmental Impact):** Scientific research for the acquisition of new knowledge and the development of key enabling technologies that will reduce the environmental impact and increase the efficiency of Unmanned Aircraft by introducing radical improvements throughout their life cycle.
- **AIRBEAM - AIRborne information for Emergency situation Awareness and Monitoring:** AirBEAM is an integrated project, responding to the ESA 2010.4.2.3 topic "information acquisition by specialised platforms, including UAVs, balloons and satellites", within the third call of the FP7 Security. With a multi-platform approach to situational awareness and through effective collaboration between industrial partners, research centres, stakeholders and end-users, AirBEAM intends to: provide and demonstrate the value to the end-users involved in crisis management, provide an integration framework at the service of the multiple initiatives related to security applications and develop the technological bases and standards that allow the rapid assimilation of this multi-platform approach by the EU Member States.
- **CRISYS - Critical Response In Security and Safety Emergencies:** The objective is to build a fully implemented work plan to show specific demonstration actions (in the second phase) and the establishment of contacts and knowledge with the main public and private actors in the field of crisis management.
- **G-MOSAIC (GMES services for management of operations, situation awareness and intelligence for regional crises):** GMOSAIC is a FP7 project that will develop products and services for security applications of the EC's GMES programme. The activities, which include demonstrations with real users in scenarios defined by them, cover areas such as border surveillance, monitoring of illicit crops, compliance with non-proliferation treaties / nuclear activities, surveillance of natural resources, population displacement, humanitarian crises and natural disasters, etc.
- **SORECYM-NRBQ - Solutions for NRBC Emergency Response in the Civil and Military Sector.** Objectives: 1.Use of novel technologies not previously applied to military solutions and solutions in motion. 2.Integration of the different solutions with each other and with C2 (Command & Control) systems, 3.Analysis of the state of the art and definition of the system, 4.Definition of protocols.
- **nSHIELD:** Development of embedded systems with data network connectivity that implement security and reliability techniques, for application in multiple fields (defence, transport, smart cities).
- **BASYLIS:** The BASYLIS project, led by Indra, aims to protect and monitor refugee camps, which are faced with constant internal and external threats, by integrating different types of sensors implemented in a given area under the same system. It also incorporates intelligent video devices for verification in detection and innovative behaviour analysis tools to reduce false alarms. This project responds to the proposal for the automatic detection and recognition of threats to critical resources in large and unpredictable EU environments "Seventh Framework Programme theme".



- **SHERLOC (Hybrid Remote Stress and Location System):** Personal location sensors, both indoor and outdoor, adding the functionality of quantifying the stress level of the located person.
- **SAN (Survivable Ad Hoc Network for 4G and beyond):** The SAN project aims to specify, design, implement and validate a 4G broadband mobile wireless communications system equipped with multiple ad-hoc capabilities and relay/mesh routing. SAN will provide a robust and efficient solution, based on LTE and LTE advanced standards, for emergency systems in disaster scenarios where wireless networks are not available.
- **PERSEUS (Protection of European seas and borders through the intelligent use of surveillance):** The Perseus project (Protection of European BoRders and Seas through the IntElligent Use of Surveillance), led by Indra, aims to protect European seas and borders through the intelligent use of technology. This pilot project, with a budget of 43.7 million and a duration of four years, is one of the first and most important initiatives financed within the framework of the EU's 7th Framework Programme for R&D and will be the most emblematic project in the area of maritime safety. Perseus responds to the demand for an integrated European system for the control of maritime borders. The project aims to develop and test a European maritime surveillance system by integrating existing national and European systems and updating and improving them with technological innovations. Through two large-scale tests, Perseus will demonstrate the feasibility of a European system and set the standard and the basis for its final development. Indra will be responsible for coordinating the work of the consortium, made up of 29 partners from 12 EU countries.
- **OSV - Advanced Optics for Optimising the Resolution of Panoramic Vision Sensors in Observation and Surveillance Applications:** To design, develop, integrate and validate new optical systems for optimising the resolution of sensors used for panoramic vision in observation and surveillance applications.
- **OPERAMAR - An Interoperable Approach to European Union MARITIME Security Management:** Operamar is a study within the 7th European Framework which aims to provide the basis for the pan-European maritime security situational awareness prescribed by the European Commission's Maritime Policy. Operamar is a joint action with the aim of providing the basis for future unified management of maritime safety. To efficiently manage European Maritime Safety activities requires the ability to collect and merge all available information creating a single relevant picture of the maritime environment so that it can be shared between all organisations within the European Member States.

INDRA can contribute with **the Vision from the programmes / committees** providing the trends of the different fields. The most important references about our experience in relevant large-scale research and innovation programmes are:

- Indra is a member of UITP (International Association of Public Transport)
- Indra is member of the Governing Board of the SHIFT2RAIL JU
- Member of UNIFE (European Rail Industry)
- Indra is a key member of SESAR JU (taking part in 124 projects and leading 28 of them).
- Indra is member of the European High Level Group (HLG) on Aviation and Aeronautics Research
- Indra is member of the EC Panel UAS: UAS common strategy in the EU as a Participant in IN EC Hearing On Light UAS (Oct. 2009) and Participant at the High Level Conference on Unmanned Aircraft Systems (UAS)
- Indra is a Steering Board member of ARTEMIS-IA (ARTEMIS Industrial Association)
- Member of EOS (European Organization for Security)
- More than 40 R&D projects in FP7 in areas such as security, Transport, ICT, Space and Energy.
- Indra is member of the EIT Digital

#### Infrastructure and Technical Equipment

A joint team comprising experts on emerging Communication Networks, Artificial Intelligence and Simulation will participate thorough the VALKYRIES project life-cycle. The Indra participation will entail an internal horizontal cooperation between the Indra and Digital Lab division. This team will leverage the infrastructure and equipment located at Digital Lab headquarters, including their labs and testbeds, over which developing and executing experiments for the project when necessary. They will allocate at least the following resources for the project:

- VMware clusters for supporting the development and formal verification activities of the project outcomes
- Security Assessment: test the security, reliability and trust of the solutions to be developed
- Massive storage systems
- Network infrastructure: Core, distribution and access
- 8 DSL lines, WAN I/O balancing

In addition, at least 6 workstations for Digital Lab's staff, including all necessary equipment (laptop, two monitors per position, network connectivity, IDE, specific software for test and verification, etc.) will be assigned to the VALKYRIES project.

#### Individual Exploitation Plan


<b>Exploitation Goals</b>	Indra develops novel products that are commercialized through its different vertical divisions as well as partners and channels all across the globe. For the disciplines targeted by the VALKYRIES' project (simulation, cybersecurity, artificial intelligence, etc.), Indra has its own lines of product, which are regarded as strategic within its portfolio of R&D actions, thus facilitating the innovation to market transition. The Resulting solutions will be delivered nationally, at the EU level and in international target markets (up to 40+ countries).
<b>Topics/Domain</b>	The Indra Digital Lab `s Lines of Business (LoB) that expect a greater benefit from the VALKYRIES project findings are: Cyber Situational Awareness <ul style="list-style-type: none"> <li>• Sectors: Public and private large organizations in sectors such as transport, banking, telco, energy (corporate networks), military, etc.</li> <li>• Geographies: Europe, LATAM, Asia-pacific</li> </ul> Cyber Range <ul style="list-style-type: none"> <li>• Sectors: Medium-large size organizations in all sectors</li> <li>• Geographies: Europe, LATAM, Asia-pacific</li> </ul>
<b>Approach and Activities</b>	Indra will exploit its internal processes to increase the TRL of VALKYRIES results in order to bring them into its products and services

#### Individual Dissemination Plan

<b>Dissemination Goals and Target Groups</b>	IND will disseminate VALKYRIES results in the trade fairs and relevant industrial/research conferences and committees it attends on a regular basis. In the scientific domain, IND will participate in national, European and international congresses and conferences; workshops and seminars; forums and exhibitions; research journals and technical reports. On the other hand, in the area of establishing relationships with industrial stakeholders, research centres and academy, IND will promote the organisation of industrial workshops, seminars, as well as participation in lectures and master's courses to disseminate the results, identify new talent and generate innovation opportunities. Finally, IND also expects to participate in industrial forums more focused on security techniques and methodologies on cyber defence and transport, carrying out demonstrations and technical workshops about the results obtained during the project.
<b>Planned Activities</b>	In the scientific domain, Indra will participate in national, European and international congresses and conferences; workshops and seminars; forums and exhibitions; research journals and technical reports. In the area of establishing relationships with industrial stakeholders, research centers and academy, Indra will promote the organization of industrial workshops, seminars, as well as participation in lectures and masters courses in order to disseminate the results,

	identify new talent and generate innovation opportunities. Finally, Indra also expects to participate in industrial forums more focused on security techniques and critical infrastructure protection, carrying out demonstrations and technical workshops about the VALKYRIES' project results.
<b>Indicative List of Events</b>	<ul style="list-style-type: none"> <li>• DG ECHO events (Civil Protection Forum) and additional EC events (DG CLIMA, DG ENV, JRC)</li> <li>• Research Workshops of the International Federation of Red Cross and Red Crescent Societies</li> <li>• The International Emergency Management Society (TIEMS) events</li> <li>• European Commission Community of User events</li> <li>• European Civil Protection Forum</li> <li>• Security Standardisation Research Conference</li> <li>• International Disaster and Risk Conference (IDRC)</li> <li>• International Conference on Preparedness &amp; Response to Emergencies &amp; Disasters</li> <li>• Military Communications and Information Systems Conference (MilCIS)</li> <li>• International Conference on Dependable Systems and Networks</li> <li>• Computer Privacy and Data Protection (CDPD)</li> <li>• SEGUREX</li> <li>• MILIPOL PARIS</li> </ul>

#### 4.1.2. SERVICIO DE URGENCIAS Y EMERGENCIAS DE LA COMUNIDAD DE MADRID (SUMMA112)

Partner Full Name	SERVICIO MADRILEÑO DE SALUD-SUMMA 112		
Short Name	SMS	Country	SPAIN
Type	PUBLIC BODY	Website	<a href="https://www.comunidad.madrid/hospital/summa112/">https://www.comunidad.madrid/hospital/summa112/</a>
Official Logo			
			
Brief Partner Profile			
<p>The organization Servicio Madrileño de Salud (SERMAS) (<a href="http://www.comunidad.madrid/servicios/salud">http://www.comunidad.madrid/servicios/salud</a>) is the administrative and management structure that integrates almost all public hospital, primary care centres, emergency services and every public health service of the Madrid Regional Public Health System. SERMAS has participated in <a href="#">44 H2020 projects</a> so far.</p> <p>SERMAS is the legal representative (beneficiary) of the main public medical centre of the Madrid Regional Health System. Usually SERMAS delegates authority to each Research Foundation of the different hospitals and primary care directorate in order to manage the research actions on behalf of SERMAS. SERMAS includes in its network 34 hospitals, 430 primary health care centres and the emergency services SUMMA 112. In 2018 the Biohealth Research Foundations of SERMAS have managed 1.078 national or regionally funded competitive research projects (28.097.718,26 €), 3.607 projects funded by private sources (18.760.002,12 €), and 90 European funded projects (4.249.971,50 €). SERMAS has gained 350 awards and recognitions in 2018.</p> <p>SERMAS-SUMMA 112 represents the emergency medical services that intervene in natural or man-made hazards. SUMMA 112 belongs to the Region of Madrid Medical Services (SERMAS). SUMMA112 is in charge of non-hospital or primary health care emergencies in Madrid region, including ordinary and urgent health transport services. SUMMA 112 also coordinates the health emergency services, having successfully managed 1.098.072 calls in 2018 Around 6.5 million people receive the SERMAS services every year. Madrid region has around 1300 firefighters in 2018, distributed all over Madrid region in 19 firefight centres that coordinate in a common network.<sup>2</sup> In 2018 the Madrid firefight services have completed 1502 rescue services. Also, in 2018 more than one exercise of emulated emergencies was performed (532 exercises testing the emergency services).</p>			
Role in Project			
SUMMA 112 will contribute to all the WPs of the project, from the point of view of expert health emergency body. SUMMA 112 will lead Task 7.5, focused on the development of a common use case with Portugal involving a fire that requires cross country collaboration.			
Relative Expertise / Experience			
Field of expertise	Description of the expertise or experience related to this expertise	Added value for the project	
EMERGENCY FIRST RESPONDERS	SERMAS assures the adequate coverage of more than 6.8 million people, having direct access to the Madrid region population through its 34 hospitals and 430 primary care centres. The infrastructures are coordinated by BioMad, created in 2018, being its goal to promote the I+D+I of Madrid Region, promoting the cooperation at Regional, National and International level, seeking to support health related technological development and innovation (Annual SERMAS Report, 2018). SERMAS was in charge of managing the COVID19 pandemia, sharing with the	Deep knowledge on actual protocols and standards, both National, European, and International. Close contact with citizens, thus aware of their needs regarding S&R operations involving multiple victims	



	consortium the knowledge acquired through these experiences, focusing on SUMMA 112 emergency services and on the hospitalization of buildings required for temporarily providing health care services to the acute cases.	
<b>Key Personnel's CVs</b>		
<p><b>Navid Behzadi. Male.</b> PhD in Medicine by Universidad de Alcalá. Degree in Medicine by Universidad Autónoma de Madrid. Specialist in Family and Communitarian medicine by Hospital Universitario Ramón y Cajal de Madrid. Máster in Medical Emergencies by Universidad Complutense de Madrid. Director of University Master on “Emergency, catastrophes and international cooperation” of Universidad Camilo José Cela since 2015. Trainer of pediatric and neonatal basic and advanced CPR by Hospital Universitario La Paz. Instructor of International Trauma Life Support (ITLS). Since 2005 he is working as doctor in the mobile units (Unidades Medicalizadas (UVI Móvil) of SUMMA 112. Previous experience in SUMMA 112 air transportation of victims SINCE 2010. Medical coordinator of the Functional Unit and Head of the Research Commission of SUMMA 112. Board member of the Scientific Committee of Fundación de Investigación e Innovación Biosanitaria de Atención Primaria (FIIBAP).</p> <p><b>Patricia Blanco Hermo. Female.</b> Degree in Medicine (2000), Specialist in Sports Medicine (2008), master’s in study of Interventions in Emergencies, Catastrophes and International Cooperation, Master in Out-Of-Hospital Emergencies. Medical Director of Athletic Training and Therapy, Director of the Master in Mountain and Inhospitable Environment, Teacher of degree and postgraduate in face to face and on-line modality in UCJC. Working in SUMMA 112 as an emergency and helicopter Prehospital Physician since 2002. SUMMA Head Boss Guard too. Co-researcher in five emergency research projects (METOCARD-CNIC, EARLY BAMI, ATLANTIC, EPIREA, DANC and Abdominal Perimeter, Inclusive CPR).</p> <p><b>David Marcos Pérez. Male.</b> He is a health emergency specialist, working at the centre command control of SUMMA 112, managing phone emergency notifications. Has participated as Clinical Secretary of the Catastrophes and Special Situations Commission of SUMMA 112. Nowadays, he is developing a Project whose goal is to incorporate a surveillance and intervention drone in the operational procedures (now being under consideration by SUMMA 112 decision makers).</p>		
<b>Relevant Publications, products, services</b>		
<ul style="list-style-type: none"> <li>Manejo extrahospitalario del paciente con traumatismo ortopédico. Fracturas, Esguinces y Luxaciones. Capitulo de libro: “Manual de Urgencias Comunidad de Madrid; ISBN: 978-84-15062-12-7; Behzadi Koochani N, de Blas y de Blas AA.</li> <li>Inmovilizacion y movilizacion de pacientes traumáticos. Capitulo de libro: “Manual de Urgencias Comunidad de Madrid; ISBN: 978-84-15062-12-7; Behzadi Koochani N, de Blas y de Blas AA.</li> <li>Analgesia y sedación en urgencias y emergencias. Capitulo de libro: “Manual de Urgencias Comunidad de Madrid; ISBN: 978-84-15062-12-7; Behzadi Koochani N, de Blas y de Blas AA.</li> <li>Blanco Hermo P, Redondo Lozano M. Respuesta humanitaria internacional de la cooperación española. Encuentro Internacional de Manejo Avanzado de IMV y Catastrofes. Valencia, 2019. ID C0007.</li> <li>Blanco Hermo P, Montero Pernia MC. Muerte súbita extrahospitalaria por infarto agudo de miocardio. Eur. Jour. Invest. Health, Psych and Educ. Murcia, 2018; vol 8. ISSN 2174-8144.</li> </ul>		
<b>Relevant Projects / Activities / Initiatives</b>		
<ul style="list-style-type: none"> <li>First responder Advanced technologies for Safe and efficienT Emergency Response (FASTER) Call: H2020-SU-SEC-2018-2019-2020 (Security) Topic: SU-DRS02-2018-2019-2020 Type of action: RIA</li> <li>affecTive basEd iNtegrated carE for better Quality of Life (TeNDER) Call: H2020-SC1-DTH-2018-2020 (Digital transformation in Health and Care). Topic: SC1-DTH-11-2019. Type of action: IA</li> <li>Value based healthcare supported by process mining tools (VALUE) EIT Health Innovation 2020</li> <li>Emerging technologies for the Early location of Entrapped victims under Collapsed Structures &amp; Advanced Wearables for risk assessment and First Responders Safety in SAR operations (Search and Rescue) Call: H2020-SU-SEC-2018-2019-2020 (Security). Topic: SU-DRS02-2018-2019-2020. Type of action: RIA</li> <li>Intelligent Toolkit for Reconnaissance and assessmEnt in Perilous Incidents (INTREPID) Call: H2020-SU-SEC-2018-2019-2020 (Security). Topic: SU-DRS02-2018-2019-2020. Type of action: RIA</li> </ul>		

### Infrastructure and Technical Equipment

SERMAS assures the adequate coverage of more than 6.8 million people, having direct access to the Madrid region population through its 34 hospitals and 430 primary care centres. The infrastructures are coordinated by BioMad, created in 2018, being its goal to promote the I+D+I of Madrid Region, promoting the cooperation at Regional, National and International level, seeking to support health related technological development and innovation (Annual SERMAS Report, 2018). SERMAS was in charge of managing the COVID19 pandemic, sharing with the consortium the knowledge acquired through these experiences, focusing on SUMMA 112 emergency services and on the hospitalization of buildings required for temporarily providing health care services to the acute cases.

### Individual Exploitation Plan


<b>Exploitation Goals</b>	Scale the knowledge of the standards and technologies developed to decision and policy makers.
<b>Topics/Domain</b>	Operational standards and technologies related to health-related emergencies involving cross-country collaboration and multiple victims.
<b>Approach and Activities</b>	See Section 1-3.

### Individual Dissemination Plan

<b>Dissemination Goals and Target Groups</b>	Contribute to making the project visible at regional, national, and international levels.
<b>Planned Activities</b>	Supporting dissemination strategy and attendance to at least 2 international major related events.
<b>Indicative List of Events</b>	See Section 1-3.

#### 4.1.3. TASSICA EMERGENCY, TRAINING & RESEARCH S.A.

<b>Partner Full Name</b>	TASSICA Emergency, Training & Research S.A.
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<b>Short Name</b>	TASSICA SA	<b>Country</b>	Spain
<b>Type</b>	Private Business Organization, For profit	<b>Website</b>	www.tassica.com
<b>Official Logo</b>			
			
<b>Brief Partner Profile</b>			
TASSICA EMERGENCY, TRAINING & RESEARCH S.A. (TASSICA SA) is a small semi-technology company with 10 years of experience in developing procedural, technological and software solutions in the specific area of emergencies and catastrophes response. It has two other fundamental branches of activity: specialized consulting in emergencies and catastrophes, and training of emergency professionals in response to emergencies and disasters.			
<b>Role in Project</b>			
<p>Due to its specific profile, TASSICA SA contributes to the project with:</p> <ul style="list-style-type: none"> <li>• Its background: expertise and its R&amp;D developments in the specific field of response to emergencies and catastrophes, in the terms established in the Consortium Agreement (CA), the Intellectual Property agreement and / or the Grant agreement (GA).</li> <li>• Advisory / consulting / technical management services in this area.</li> <li>• Education &amp; training services in response to emergencies and catastrophes.</li> </ul>			
<b>Relative Expertise / Experience</b>			
<b>Field of expertise</b>	<b>Description of the expertise or experience related to this expertise</b>	<b>Added value for the project</b>	
<b>R&amp;D</b>	<p>TASSICA SA integrates multidisciplinary teams that simultaneously combine active professional practice with R&amp;D tasks. This allows us to maintain a permanent harmony between the company's lines of work, the scientific vanguard and professional reality.</p> <p>The staff and collaborators staff includes professionals from all emergency services (health, security, fire, civil protection) with special preparation for the investigation and with a high level of knowledge on all the key aspects of the response to disasters.</p> <p>This fact gives TASSICA SA an important presence in Spain in the development of R&amp;D solutions for emergency health services.</p>	10 years' experience in developing R&D solutions for emergency services in disaster response.	
<b>Consulting / technical direction.</b>	<p>Professionals from TASSICA SA have held positions of responsibility in different emergency services and in different fields: healthcare, technology, management, etc.</p> <p>TASSICA SA contributes this experience into its consulting or technical management services, in different companies and institutions in the field of emergencies and catastrophes.</p> <p>In addition, TASSICA SA gathers extensive experience in organizing disaster intervention drills for testing tools and for training emergency service staff and first responders.</p>	Consultants specialized in all aspects related to preparedness and response to emergencies and catastrophes.	
<b>Education &amp; training.</b>	<p>TASSICA's education and training programs extend to the entire national territory of Spain, as well as to different countries of Central and South America.</p> <p>In Spain, TASSICA SA is a benchmark in the training of health emergency professionals, both Technicians, Nurses and Doctors,</p>	Accredited educational experience at the highest level, a reference in Spain in the training of health professionals in the	

	<p>having trained thousands of professionals in the last 10 years only in its accredited training programs in the European Higher Education Area (EHEA).</p> <p>Likewise, TASSICA SA and its different training programs are accredited by international institutions such as NAEMT (National Association of Emergency Medical Technicians, USA), ICAR (International Commission for Alpine Rescue), etc.</p> <p>Furthermore, in collaboration with its R&amp;D department, TASSICA SA develops its own tools aimed at optimizing training, based on the latest learning technologies, including simulation.</p>	specialty of emergencies and catastrophes.
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#### Key Personnel's CVs

##### **Alberto Montarelo (male) is:**

- Founder and General Manager of TASSICA SA.
- Specialist Doctor in Family and Community Medicine
- Master's Degree in Emergency Medicine
- Emergency Physician (Senior Consultant) at SUMMA 112, (Servicio de Urgencias Médicas de Madrid 112), Spain.
- Coordinator of the Working Group on Mass Casualty Incidents in SUMMA 112, Madrid, Spain.
- Holder of various IPs in relation to the response to urgencies, emergencies, and catastrophes.
- Professor at various university Masters in the doctrinal field of urgencies and emergencies.
- Scientific Director of the Cátedra Tassica de Estudios Avanzados of the San Pablo CEU Foundation (ISEP CEU, Madrid, Spain)

##### **Carlos Isidro Sierra (male) is:**

- Founder and CEO of TASSICA SA.
- Bachelor's Degree in Business
- Master's Degree MBA in Health Business Management by CEU San Pablo University.
- Professor at various university Masters in the doctrinal field of Health and Business.

##### **María del Carmen Martín Curto (female) is:**

- Technical Director at TASSICA
- Emergency Physician at SUMMA 112, (Servicio de Urgencias Médicas de Madrid 112), Spain.
- 2017-2019: Deputy Director General of Operational Coordination at the Madrid 112 Security and Emergency Agency.
- 2015-2017: Head of the Civil Protection Division in the Dirección General de Protección Ciudadana of the Community of Madrid, Spain.
- 2008-2015: Head of the Department of Disasters and Special Services of SUMMA 112, Madrid. Spain.
- Medical Commander of the Spanish Army, on leave of absence.
- CBRN risk specialist
- Master's Degree in Research Methodology in Health Sciences.
- Doctor's Degree in Intra and Extra-Hospital Health Research.

##### **David Bravo (male) is:**

- Director of the IT Department at TASSICA.
- Computer engineer.
- Consultant specialized in web technologies.
- Responsible for the development of applications MCI Management and App Tassica MCI, among others.

#### Relevant Publications, products, services

The following are some of the R&D results of TASSICA SA applied to the response to emergencies and catastrophes:

- 2010: TASSICA-2 triage card: used by reference health emergency services in Spain such as the SUMMA 112 in Madrid, the SESCAM in Castilla La Mancha or the Unidad Militar de Emergencias (UME), among others.
- 2011: TASSICA MCI Management: software for health management of mass casualty incidents (FEDER funds financing).
- 2018: APP TASSICA MCI: mobile application for on-site health intervention against incidents with multiple victims (finalist in the award for the best App in emergencies at the National Congress of SEMES, Sociedad Española de Medicina de Emergencias).

Related to consulting / technical management, TASSICA SA offers the following services, among others:

- Development of intervention procedures in mass casualty incidents with and disasters.
- Development of solutions for intervention in mass casualty incidents with and disasters.
- Development of learning tools for training of professionals in emergency services.
- Development of training programs for professionals in the emergency services and first responders.
- Organization and development of simulation exercises for training in mass casualty incidents and disasters response.

In the area of education and training applied to emergencies, these are some of the most relevant programs organized by TASSICA SA:

- Since 2011: Master Universitario en Urgencias, Emergencias y Catástrofes (Master's Degree in Emergencies and Disasters), in collaboration with CEU San Pablo University in Madrid, Spain. Included since 2017 in the 5 bests Masters in Emergency and Public Health by the newspaper El Mundo.
- Since 2012: CFGM Técnico en Emergencias Sanitarias (Intermediate Degree Emergency Medical Technician) in collaboration with the ISEP CEU Institute, in Madrid and in Castellón (Valencian Community), both of them in Spain.
- Since 2016: Master Universitario en Urgencias en Montaña y Medios Inhóspitos (Master's Degree in Mountain and Wilderness Emergencies), in collaboration with the Camilo José Cela University of Madrid, Spain. First official Master in mountain and wilderness medicine throughout the European Higher Education Area.
- Since 2019: Master Universitario en Urgencias y Emergencias Sanitarias (Master's Degree in Emergencies), in collaboration with the International University of Catalonia (Universitat Internacional de Catalunya UIC), in Barcelona, Spain.

#### Relevant Projects / Activities / Initiatives

Currently, TASSICA SA maintains active all the products and services listed above, as well as others in several fields of health and medicine. As an internal project related to emergencies and catastrophes, is currently under development the application "Tassica MCI First Triage Simulator": software for basic simulation and training for the triage in mass casualty incidents.

#### Infrastructure and Technical Equipment

Headquarters in Segovia (Castilla León) and San Sebastián de los Reyes (Madrid), both in Spain. Service delivery based on cloud infrastructure.

#### Individual Exploitation Plan

<b>Exploitation Goals</b>	<p>Because of its participation in the consortium, TASSICA SA has the following fundamental exploitation goals:</p> <ul style="list-style-type: none"> <li>• Advance in the TASSICA SA business line.</li> <li>• Consolidation of TASSICA SA in the Hispanic market and projection in the European and Latin American markets.</li> <li>• Exploitation of the project results, under the terms established in the Consortium Agreement, the Intellectual Property agreement and / or the Grant agreement.</li> </ul>
<b>Topics/Domain</b>	<p>Within the terms established in the Consortium Agreement (CA), the Intellectual Property agreement and / or the Grant agreement (GA), the individual exploitation plan of TASSICA SA would fundamentally contemplate the following topics:</p>




	<ul style="list-style-type: none"> <li>• Participation in the commercial exploitation of the project results.</li> <li>• Own use of the project results by TASSICA SA</li> <li>• Provision of specialized consulting services, based on the previous background and the knowledge acquired in the development of the project.</li> </ul>
<b>Approach and Activities</b>	<p>Within the terms established in the Consortium Agreement (CA), the Intellectual Property agreement and / or the Grant agreement (GA), the individual exploitation plan of TASSICA SA would fundamentally contemplate the following approach and activities:</p> <ul style="list-style-type: none"> <li>• Participation in the commercial exploitation of those results of the project in which TASSICA SA would have participated.</li> <li>• Use of the solutions resulting from the project, in simulation mode, in the training actions of TASSICA SA related to emergencies and disasters.</li> <li>• Participation as specialized consultants and trainers in the planning, development and execution of dissemination or training actions related to the project results.</li> <li>• Participation as specialized consultants in the implementation of the project results in the end-users.</li> <li>• Participation as consultants specialized in the scientific exploitation of the data derived from the implementation of the project results.</li> </ul>

<b>Individual Dissemination Plan</b>	
<b>Dissemination Goals and Target Groups</b>	<p>The dissemination activities carried out by TASSICA SA will aim to ensure adequate dissemination of the project and results in its usual areas of influence, for those stakeholders who could benefit from and / or build on its direct or future results.</p> <p>These natural areas of influence of TASSICA SA could be:</p> <ul style="list-style-type: none"> <li>• Emergency services and professionals (doctors, nurses, emergency technicians, security professionals, firefighters, civil protection personnel) in Spain, Central America, South America, and USA.</li> <li>• Learning centres: universities, institutes, training centres, etc. in Spain, Central America, South America, and USA.</li> </ul>
<b>Planned Activities</b>	<p>The dissemination actions by TASSICA SA will follow the entire life of the project. They will be planned and carried out according to the parameters established in the general dissemination plan of the project, regarding both communication activities and information that will be sent externally to interested parties. After the end of the project, dissemination actions related to the scientific exploitation of the data provided by the application of the project results would also be considered. The accessibility and data protection policy would always be within the terms established in the general plan of the project and that imposed by the laws in force in each case. Likewise, they will always be carried out ensuring adequate recognition of the source of EC funding in all communication and dissemination activities.</p>
<b>Indicative List of Events</b>	<p>Some of the channels and events that TASSICA SA contemplates are:</p> <ul style="list-style-type: none"> <li>• Seminars and conferences: both online and in person, for communication of the project and, once completed, for the dissemination of the results.</li> <li>• Congresses: presentation of the project results in national and international professional meetings related to emergencies.</li> <li>• Professional and scientific publications: to promote the results of the project and to communicate the impact of the data derived from its application.</li> <li>• Training actions: the study of the project and its results will be included in all the training programs of TASSICA SA related to emergencies or catastrophes.</li> </ul>

	<ul style="list-style-type: none"><li>• Corporate website: the TASSICA SA website, where a predominant space will be established for this purpose, will be used as a communication and dissemination.</li><li>• Social networks: TASSICA SA's institutional profiles on Facebook, Twitter, Instagram and LinkedIn will be used to disseminate the project results to a wider audience.</li></ul>
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#### 4.1.4. INTERNATIONAL SECURITY AND EMERGENCY MANAGEMENT INSTITUTE

Partner Acronym	Partner Full Name	Country	Partner Type	
ISEMI	ISEM – International Security and Emergency Management Institute, n.p.o.	Slovakia	End user	 <p>INTERNATIONAL SECURITY AND EMERGENCY MANAGEMENT INSTITUTE</p>
Partner Description				
<p>ISEM – International Security and Emergency Management Institute (ISEMI) is a non-profit organisation providing generally beneficial services, registered within the Registry of the Ministry of Interior of the Slovak Republic under registration number.: OVVS/NO – 7/14.</p> <p>ISEMI is a professional platform of former or active police and national security officers, military, civil protection and crisis management experts from around the world with necessary security clearance and relevant long-term experience in crime prevention, counter-terrorism and CBRN-E threats, in the fight against organized crime, environmental crime, trafficking in human beings, cybercrime, drugs and weapons smuggling. Organization together with wide pool of experts has a number of experiences of intelligence analysis, defence policy, border protection, critical infrastructure protection, countering hybrid threats, rescue and emergency assistance, health protection and in the field of justice and prosecution.</p> <p>ISEMI has been accredited by National Security Agency to handle with classified data at “EU, NATO Secret” with all necessary technical equipment and premises.</p> <p>Based on written Mutual cooperation agreement between ISEMI and Ministry of Interior of the Slovak Republic, both partners are allowed to represent one another, including in H2020 projects in area of security, crisis management, civil protection, infrastructure protection, integrated rescue system, mitigation of crisis situations consequences, enviro and other types of crimes.</p>				
Key Persons Involved				
<p><b>Martin Kostolný (male).</b> He is graduated at the University of Žilina, (Faculty of Security Engineering, Master – Civil Security). He is experienced in EU project management including technical contributions (including managing international teams, coordination of activities and tasks in related projects, RDI activities, police and first responders cooperation, needs assessment, training development including providing of these trainings, preparation and carrying out of different types of trainings, trials/tests/demonstrations, study visits and workshops. He participates on several projects related to CBRN threats, H2020, networking and DRR. He is PRINCE2 certified manager. He can speak English and his native language is Slovak. He has personnel security clearance certificate NATO SECRET as well as EU SECRET.</p> <p><b>Galya Toteva TERZIEVA (female).</b> She has more than 15 years of experience in the development and implementation of different EU-funded projects including DRI. Currently she is focusing on RDI related to technologies and techniques in security area (aiming LEAs, counter terrorism, cyber security, trafficking and smuggling as well as DRR and civil protection. She is experienced in drafting proposals, assign tasks and activities linked to results and objectives pursue as well as in training design for capacity building and institutional strengthening projects including budgets and fundraising. She is speaking fluently English as well as Slovak, France and Bulgarian.</p>				

<p><b>Eduard Matanin (male).</b> He is an active policemen, almost 30 years of experience mainly in illegal migration, trafficking in human beings, smuggling of goods and drugs, currently Head of the Airports Protection Department, National Drug Enforcement Unit, National Crime Agency, Prezidium of the Police Force, Ministry of Interior of the Slovak Republic. He can speak English, Russian and partially German and Italian.</p> <p><b>Alena Dikošová (female).</b> She is graduated at Alexander Dubček University of Trenčín, Faculty of Social and Economic Relations, she has 10 years experiences in project management. She was working as an international coordinator of projects co-financed by Community Initiative EQUAL. She was also a trainer of accredited training Professional assistance, creation, and management of EU projects. At present she is working as a project manager - implementation of projects in the field of security and emergency management. She can speak English fluently.</p>
<p><b>Role in the Project</b></p>
<p>Contributions on end-user's requirements collecting, reviewing of projects outputs from the point of view of end user, implementation of test in Slovakia.</p>
<p><b>Publications / Products / Services / Achievements relevant to the project</b></p>
<p>n/a</p>
<p><b>Relevant previous projects or activities connected to the subject of this proposal</b></p>
<ul style="list-style-type: none"> <li>• SOS-Alert Solution: Capacity building for border security with focus on CBRN threats.(<a href="https://eeagrants.org/archive/2009-2014/projects/SK08-0001">https://eeagrants.org/archive/2009-2014/projects/SK08-0001</a>)</li> <li>• ILEAnet - Innovation by Law Enforcement Agencies networking including counter-terrorism component (<a href="https://www.ileanet.eu/">https://www.ileanet.eu/</a>)</li> <li>• IProcureNet: Innovation by developing a European Procurer Networking for security research services (<a href="https://www.iprocurenet.eu/">https://www.iprocurenet.eu/</a>)</li> <li>• Series of three MTIC focused projects (MTIC Frauds STOP I, II and III) funded from EUROPOL</li> <li>• Series of projects under EU CBRN CoE Initiative in capacity building including cross-border topics.</li> </ul>
<p><b>Significant infrastructure / major technical equipment relevant to the proposed work</b></p>
<p>Own premises which might be used for smaller project meetings. But mainly, based on mutual cooperation agreement with MoI SR (including state police), ISEMI can dispose with their capacities, which might be used for project purposes – mainly for test activities.</p>

#### 4.1.5. PARTICLE SUMMARY

Partner Full Name	PARTICLE SUMMARY		
Short Name	PARTICLE	Country	Portugal
Type	SME	Website	<a href="https://particle-summary.pt/wp/">https://particle-summary.pt/wp/</a>
Official Logo			
			
Brief Partner Profile			
<p>Founded in 2019, PARTICLE SUMMARY (PARTICLE) is a Portuguese start-up with a technology drive that provides secure applications for enhanced situational awareness (at headquarters and mobile <i>on-the-move</i>) supported by cyber-physical systems, high-throughput data exchange (e.g., high frequency sensor data, audio and video) and Big Data. PARTICLE solutions are fit for Emergency, Security and Defence applications. PARTICLE solutions integrate robust communication protocols, including mesh networking, secure cloud platforms and Big Data architectures enabling advanced analytics and artificial intelligence upholding innovative interoperability, security and privacy features.</p> <p>Within PARTICLE's advanced product, solution and service portfolio, the prevailing building blocks are:</p> <ul style="list-style-type: none"> <li>• <b>Situational Awareness Tools</b> allowing teams and individuals to visualise and understand tactical scenarios, based on collected and shared intelligence among its members (e.g., team geolocation, points-of-interest, geo-tagged multimedia). The <b>Situational Awareness Tools</b> support configurations such as C2 headquarters (web-based tools for decision makers and team leaders generating maps, statistics, charts, briefings, reports, alerts) and mobile scenarios (running in consumer tablets and smartphones with hardened security measures).</li> <li>• <b>Smart Sensing Platforms for Real-time Monitoring</b> collecting measurements from wearables (e.g., activity bands and heart rate) and environmental sensors (e.g., temperature, smoke, gases).</li> <li>• <b>Robust Secure Communications</b> supporting secure broadband connectivity, including mesh networking for resilient communications while on the move and indoor.</li> <li>• <b>Secure Private Cloud Services</b> that further extend PARTICLE solutions with secure online access (anywhere, anytime) providing Big Data capabilities and additional high-performing and intensive computing services (AI-ready) for authenticated users.</li> </ul>			
Role in Project			
<p>PARTICLE brings its expertise in the development of situational awareness tools and mobile applications for the healthcare and security domains. PARTICLE will also support the Spain-Portugal demonstrator, in close collaboration with HESE. As a private for-profit entity, PARTICLE will strive to achieve commercial sustainability of project results, participating in Task 3.6 (commercial deployment). PARTICLE contributes in WP2 to the system requirements and demonstrations (Task 2.1), terminology (Task 2.2) and leads the overall architecture and APIs (Task 2.3). In WP4, concerning technologies for first-responders, PARTICLE brings its expertise in communications and information exchange applied in mobile environments (Manso et al., 2019) in Task 4.2 and command and control technologies (Task 4.3). In Task 4.5, PARTICLE brings its expertise in the application of wearable devices. In WP5, PARTICLE adapts its eSAFER platform for the VALKYRIES command and control (Tasks 5.3 and 5.4). In WP6, PARTICLE contributes with information sharing with healthcare systems (Task 6.1). As technology provider, PARTICLE contributes to all tasks in WP7 (integration and demonstrations), with special emphasis in the support of the demonstration Spain-Portugal (Task 7.5).</p>			
Relative Expertise / Experience			
Field of expertise	Description of the expertise or experience related to this expertise	Added value for the project	
<b>C2 and Information Exchange</b>	PARTICLE staff has expertise from more than 20 years in command and control systems, participating in NATO groups involved in information exchange mechanisms in mobile networks (disconnected, intermittent, limited).	PARTICLE brings their expertise in VALKYRIES to enable efficient information exchange in emergency situations.	

<b>Healthcare and IoT wearables</b>	PARTICLE develops solutions for the healthcare domain, connecting wearables and IoT to mobile Apps and secure online services (by PARTICLE).	PARTICLE brings their expertise in mobile Apps and connecting wearable devices.
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#### Key Personnel's CVs

**Marco Manso** (male) is **PARTICLE's CEO and Innovation Officer**. Marco is founder, CEO and Innovation Officer of PARTICLE, a SME based in Portugal, devoted to develop solutions for security and critical systems requiring high-availability and reliability. He has more than 15 years of experience working in the Security and Defence market, including more than 10 years in Executive and R&D Positions. He provides Senior Strategic Consultancy to several SMEs including future developments foresight, innovation roadmapping and identifying international partnerships. Between 2015 and 2018, he coordinated the H2020 Action NEXES (Next Generation Emergency Services) a European project supported by the European Commission involving 17 partners. He is Graduated in Electronics and Computer Sciences by the Technical University of Lisbon, MSc. in Information Warfare/Competitive Intelligence by the Portuguese Military Academy and PhD Student in Earth and Space Sciences at the University of Évora. He has collaborated in several NATO groups and studies: SG-102/103: Soldier Systems Interoperability; SG-115: NEC Infrastructure for dissemination of ISR data; SAS-065: NATO NEC C2 Maturity Model; SAS-085: C2 Agility; SAS-104 (C2 Agility: Next Steps); SAS-143 (Agile Multi-Domain C2 of Socio-Technical Enterprises in Hybrid Operations); IST-118 (SOA Recommendations for Disadvantaged Grids in the Tactical Domain); IST-150 (NATO Core Services profiling for Hybrid Tactical Networks).

He has authored and contributed to several papers and book chapters on Command and Control, ELICIT Experimentation, Social Media, Sensor Networks, IoT and Emergency Services. **From 2015 to 2018, he coordinated the H2020 Action NEXES (Next Generation Emergency Services) a European project involving 17 partners supported by the European Commission.**

**Bárbara Guerra** (female) is **PARTICLE's Business Development and Marketing Officer**. She has a MSc. in International Relations by the Lisbon Technical University and a post-graduation degree in Information Warfare/Competitive Intelligence from the Portuguese Military Academy. She has more than 15-year experience as Head of Business Development, Marketing and Communication for companies in the information technologies and defence and security sectors, coordinating small (4 persons) to large (36 persons from 14 different companies in the business group) multidisciplinary teams. As the Head of Business Development, she was responsible for identifying and managing yearly business opportunities worth more than 30 million euros that significantly diversified the company's customer base. As an entrepreneur, Bárbara Guerra founded a successful marketing and communication company that handled marketing materials and communication activities for numerous mid-sized companies in Portugal and Europe. She worked in research and experimentation projects on network-enabled environments and social networks, involving the U.S. Naval Postgraduate School and NATO research and technology working groups. Further, she conducted extensive research work on social media and IoT applied to emergency management, publishing several papers, one of which has won the Best Paper Award at the 17<sup>th</sup> ICCRTS on the topic of Social Media in Crisis Situations, and contributing as author to the *Strategic Intelligence Management*, by Babak Akhgar and Simeon Yates, published by Butterworth-Heinemann in 2013, and to the *Integration, Interconnection, and Interoperability of IoT Systems*, published by Springer in 2017.

**José Nuno Pires** (male) is PARTICLE's CTO. He has a MSc in Computer Science Engineering and more than 10-year experience and knowledge in several programming languages, Agile development methodologies, operating systems, cloud platforms, content management systems and web frameworks. He is the co-author of the book *Python – Complete Course*, 2002, ISBN 978-972-722-270-4. He is responsible for the development of PARTICLE's IoT platform and cloud services, as well as the integration of smart devices, including the implementation of cybersecurity protocols.

**Col. Fernando Freire** (Male): [Security Project Manager] Col. Freire is PARTICLE's manager for security-related projects. He has more than 30 years of military career and around 15 years of experience working in research activities in collaboration with the Security and Defence in Military Academy Research Centre (CINAMIL) and RTO/NATO groups (e.g., SAS-050, SAS-065, SAS-085, SAS-143). He taught Operations Research and Decision Theory at Military Academy (for ten years) and Military Advanced Studies College (for three years). He was an advisor in Portuguese Defense College and coordinated activities on cybersecurity



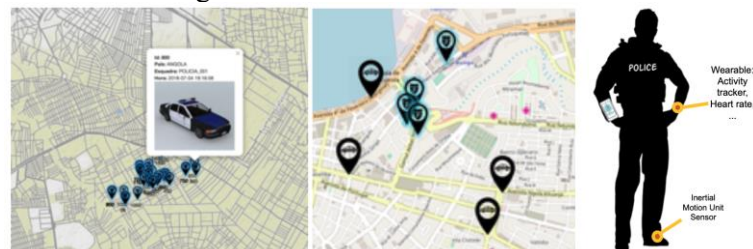
contributing to a National Information Strategy. He has a university degree in Military Sciences from the Portuguese Military Academy, a Msc. in Information Management from Coimbra University.

### Relevant Publications, products, services

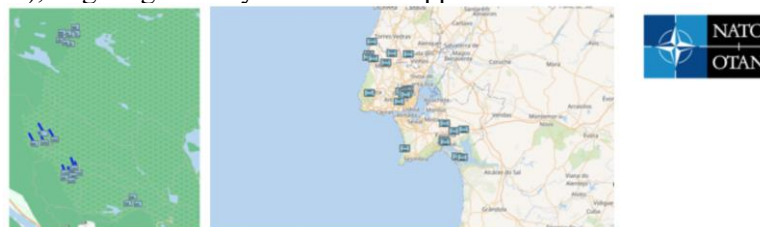
- **Manso, M., Guerra, B.** et al. (2020), *Innovative Toolkit to Assess and Mitigate Cyber Threats in the Healthcare Sector in Cyber-Physical Threat Intelligence for Critical Infrastructures Security: A Guide to Integrated Cyber-Physical Protection of Modern Critical Infrastructures*, edited by John Soldatos, James Philpot and Gabriele Giunta, pp. 208–227, Now Publishers, DOI: 10.1561/9781680836875.ch12.
- **Manso, Marco; Guerra, Barbara; Freire, Fernando;** Jansen, Norman; Chan, Kevin; Toth, Andrew; Bloebaum, Trude Hafsøe & Johnsen, Frank T. (2019). Mobile Tactical Forces: Experiments on Multi-broker Messaging Middleware in a Coalition Setting. International Command and Control Research and Technology Symposium (ICCRTS) proceedings. ISSN 2577-1604.
- **Marco Manso**, Frank Johnsen, Ketil Lund and Kevin Chan. Using MQTT to Support Mobile Tactical Force Situational Awareness. International Conference on Military Communications and Information Systems (ICMCIS), Warsaw, Poland 22-23 May 2018. <https://doi.org/10.1109/ICMCIS.2018.8398732>.
- **Marco Manso**, Frank Johnsen, Ketil Lund and Kevin Chan. Using MQTT to Support Mobile Tactical Force Situational Awareness. International Conference on Military Communications and Information Systems (ICMCIS), Warsaw, Poland 22-23 May 2018. <https://doi.org/10.1109/ICMCIS.2018.8398732>.
- Mihai B., **Bárbara G. and Marco M.** (2018), *Smart Device Prototype for Automated Emergency Calls - Using SIP and TTS to Reach Legacy Emergency Services*, 7th International Conference in Sensor Networks (SENSORNETS 2018), January 22-24, Funchal, Portugal, 2018.
- Evangelos S., Anastasia B., Manolis T., Angelos A., **Bárbara G. and Marco M.** (2017), *Next Generation Automated Emergency Calls*, IEEE CCNC (Globe-IoT 2017), January 8-11, Las Vegas, USA, 2017.
- **Marco M., Bárbara G.** et al (2016), *The Application of Telematics and Smart Devices in Emergencies: Use Cases in Next Generation Emergency Services*, IEEE International Conference on Cloud Engineering (IC2E), April 4-6, Berlin, Germany, 2016.

### Mobile Situational Awareness Tools

PARTICLE developed a suite of Situational Awareness solutions for private and governmental applications. The solutions are fit for mobile units operating in security and emergency situations. The solution supports mobile devices, wearables (for monitoring activity and health status of professionals) and blue force tracking for enhanced communications and information exchange.



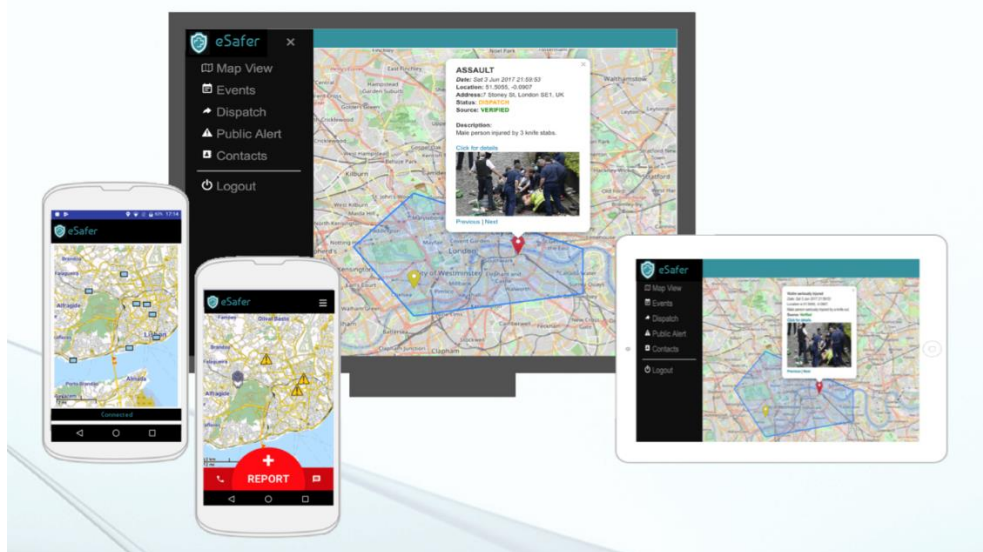
PARTICLE platform was demonstrated as part of the NATO group IST-150 (NATO Core Services profiling for Hybrid Tactical Networks), targeting security and defence applications.



### eSafer Emergency App for Citizens

**eSafer** is a mobile application for citizens to contact 112 services or third-party emergency service provider to report disaster and/or emergency incidents, using multi-channels such as messaging, images, video and automatic location. Upholding responsible citizenship, **eSafer** includes social functions, such as one-to-one (e.g., officer to citizen private message) and one-to-many (e.g., officer to citizens geo-cast message), thus supporting public alerting from public authorities on mass casualty incidents. Because disaster and emergency situations may evolve quite rapidly, the **eSafer App** also allows citizens not only to maintain contact with the emergency authorities and

receive new situation updates, but also to receive instructions or guidance on how to adequately manage the emergency situation until the arrival of first responders, saving lives in the process.



The **eSafer** Platform is a situational awareness tool that provides an intuitive and comprehensive disaster/emergency incident management system, displaying the citizens' reported events, in a georeferenced context and associated with multimedia data (photos, videos and text), that clearly identify the incident's type, severity, location and time, as well as its status (open, closed, waiting for dispatch, dispatch sent). All reported disasters/emergencies in **eSafer** present a trustworthiness factor (verified vs. non-verified) to determine the degree of trust on the information source. This information enables the generation of the *big picture* of a mass casualty event and truly understand the nature and level of the emergencies. The **eSafer** Platform enables the monitoring of the disaster/emergency response effort, as well as the dissemination of public alerts and emergency-related information to citizens, through the **eSafer** Emergency App for Citizens.

**eSafer** is built with embedded analytical capabilities at their core, allowing the exploitation of information through alerting, triage, enrichment and operationalisation. Its open architecture ensures that operatives within the organisation are always able to access their data and related insights in the most effective and relevant manner, gaining true situational awareness. Through the integration of the different aspects of emergency response, **eSafer** lies a foundation for sharing and communication, performing as a powerful tool that is capable to further enhance and reinforce the emergency organisations' capacity to respond to emerging disasters/emergencies and take corrective action in the face of significant incidents and anomalous behaviour. As **eSafer** supports triage and prioritisation, it also facilitates fast information gathering and exchange in the immediate aftermath of an emergency incident, which could prove fundamental to deliver adequate emergency response when time is of the essence.

### Relevant Projects / Activities / Initiatives

PARTICLE's team members participated in the following EU-funded projects:

- NEXES (Next Generation Emergency Services, H2020 GA 653337).**  
 The NEXES Project researched and validated the integration of IP-based communication technologies and interoperability in the next generation emergency services, enabling (i) the use of total conversation capabilities; (ii) the exploitation of improved location; and (iii) the enhanced interoperability and shared awareness among emergency services, to the benefit of a more secure society.
- SOTERIA (Online and Mobile Communications for Emergencies, FP7, GA 606796).**  
 The SOTERIA Project aims to research and develop recommendations and an associated toolbox that leverage the positive impact of social media in emergencies, enabling public safety organisations (PSOs) and citizens using new mobile and online social media technologies to communicate before, during and after an emergency event, and exchange critical information for the PSOs' intervention in emergency, law enforcement and medical assistance situations. SOTERIA innovates the approach to the dynamics between PSOs and citizens in emergencies, allowing (i) the understanding of the impact social media entails in emergency management systems; (ii) the use of all communication channels in emergency situations, including social media, to the

benefit of PSOs and citizens, (iii) the exploitation of mobile platforms' ubiquity to locate and effectively communicate with citizens in distress and (iv) the leverage of PSOs' levels of shared awareness and performance, benefiting from citizens' social media information.

- **iSAR+ (Mobile and Online Communications for Crisis and SAR Actions, FP7, GA 312850).**

The iSAR+ Project aims to create guidelines and a technological platform to enable the adoption of novel online and mobile communications in crisis situations, supporting the bi-directional provision, dissemination, sharing and retrieval of information essential for critical PPDR intervention, in search and rescue, law enforcement and medical assistance. Empowered by new communication media, such as mobile phones with cameras and internet-based applications connecting to social media platforms, citizens are the in situ first sensors. iSAR+ innovates the approach to the dynamics between citizens and PPDRs in crises, allowing (i) the leverage of PPDRs' levels of shared awareness and performance, benefiting from citizens' published information, (ii) the exploitation of mobile platforms' ubiquity to search, locate and effectively communicate with citizens and (iii) the redirection of citizens' large energy and information flow into PPDRs platforms.

### Individual Exploitation Plan

<b>Exploitation Goals</b>	<p><b>PARTICLE</b> is a R&amp;D intensive SME, specialised in the exploitation of IoT technologies to create intelligent ambiances promoting secure societies. <b>PARTICLE</b> aims to exploit the outcomes of the project to advance the capabilities offered by its solutions portfolio and acquire sound competitive advantage in the market, leveraging on the company's customer base. Specifically, <b>PARTICLE</b> will mature the eSafer solution with the project's developments involving advanced emergency assistance services, improved mobile communications and enhanced prioritisation and triage capabilities, to consolidate its commercial stance.</p> <p>In addition, <b>PARTICLE</b> will benefit from the Project's results to explore the participation in joint exploitation of software solutions and services with research institutes and companies complementing our offer, the fostering of strategic partnerships with European emergency authorities and service providers as a specialised software provider, and the participation in future collaborative R&amp;D endeavours to build state-of-the-art knowledge and expertise and innovative solutions for forthcoming challenges to the emergency, public safety and security markets.</p>
<b>Topics/Domain</b>	Emergency services; Ambulance Services; Civil Protection Authorities.
<b>Approach and Activities</b>	<p><b>PARTICLE</b> will benefit from the Project's results to explore the participation in joint exploitation of software solutions and services with research institutes and companies complementing our offer, the fostering of strategic partnerships with European emergency authorities and service providers as a specialised software provider, and the participation in future collaborative R&amp;D endeavours to build state-of-the-art knowledge and expertise and innovative solutions for forthcoming challenges to the healthcare, emergency, public safety and security markets. After project closure, <b>PARTICLE</b> will keep the software available to partners (expressing interest in purchasing the solution) for one year, also allowing to mature the solution to TRL8. <b>PARTICLE</b> expects to initiate first sales 1 year after project closure, first to VALKYRIES partners, then expanding to additional international countries (e.g., Angola, Brazil).</p>

### Individual Dissemination Plan

<b>Dissemination Goals and Target Groups</b>	<p>Goals: create awareness of VALKYRIES and PARTICLE solutions.</p> <p>Target Groups: Emergency services; Ambulance Services; Civil Protection Authorities, Policy makers.</p>
<b>Planned Activities</b>	<p><b>PARTICLE</b> aims to disseminate the project's results and project achievements through the publication of at least 2 scientific peer reviewed papers in renowned security-related conference proceedings.</p> <p>Also, <b>PARTICLE</b> plans the participation in 2 IoT and Security-related events</p>



	<p>(exhibitions, fairs, workshops, meetings), involving an audience of more than 100 participants.</p> <p>In addition, <b>PARTICLE</b> will support cross-fertilisation and networking activities between the Project and relevant initiatives in the emergency field, including those involving the European Emergency Number Association (EENA) and the Pan-European Mobile Emergency Applications (PEMEA) standardisation effort.</p> <p><b>PARTICLE</b> will contribute to the project's website and social media platforms and will promote them to <b>PARTICLE</b>'s contact network.</p> <p>Finally, <b>PARTICLE</b> will produce at least 3 blog entries associated with the Project that will be published in the company's official website and social media pages.</p>
<b>Indicative List of Events</b>	<p>Events (conferences, workshops, meetings):</p> <ul style="list-style-type: none"> <li>• IEEE Conference on Connected Health: Applications, Systems and Engineering Technologies</li> <li>• IOT Solutions World Congress</li> <li>• the EENA Conference</li> <li>• SMI2G Brokerage Event</li> </ul> <p>Networking and clustering:</p> <ul style="list-style-type: none"> <li>• Integrated Mission Group for Security (IMG-S)</li> <li>• PEMEA Network</li> </ul>

#### 4.1.6. UNIVERSIDAD DE MURCIA

<b>Partner Full Name</b>	<b>Universidad de Murcia</b>		
<b>Short Name</b>	UMU	<b>Country</b>	Spain
<b>Type</b>	Higher Education	<b>Website</b>	<a href="http://www.um.es">http://www.um.es</a>
<b>Official Logo</b>			



### Brief Partner Profile

The University of Murcia (UMU) is a large university with approximately 36,000 students and 3,000 staff members. For the Faculty of Computer Science, the Intelligent Systems and Telematics Group, from the Department of Information and Communications Engineering will be participating in the project. This group with more than 40 members has experience in most of the current topics being covered by the VALKYRIES project. Its members have been working in more than 30 research projects in the last few years, being more than 50% of them funded by the European Commission.

Relevant to the VALKYRIES project, the UMU team involved in the project has been working in different aspects such as cybersecurity and its tight combination with safety, trust and risk management, privacy-preserving data sharing, as well as their implementation in highly dynamic scenarios with multiple parties. In addition, the team is also involved in the application of Machine and Deep Learning algorithms to enable adaptive tactics in the prevention, detection, and enforcement of countermeasures to be applied in tactical networks, among others. This expertise knowledge has been applied to different national and international research projects, as well as multiple collaborations where its members have been participating in the last few years. Worth mentioning the number of solutions and proof-of-concepts (TRL 5-6) that the UMU is owning as result of the important number of projects and contracts with national and European companies in different sectors.

The UMU's team is also participating in several security-related bodies on 5G, with an active liaison in the 5G PPP Security WG and the 5G-PPP NetMgmt WG.

### Role in Project

The main role of the UMU in VALKYRIES will be focused on a technological plane, and especially on the communications hub to enable secure and trusted links between end-user terminals (belonging to the first responders) and the infrastructure (where the command and control centres will be operating). Due to that, UMU will be acting as leader of WP4 ("Equipment and ICT enablers for First Aid Responses") where, in addition to the above characteristics, supportive autonomous units and the support of wearable devices will also come into play. Starting from the top, UMU will be involved as a first effort in the requirements analysis phase (WP2) that will drive the rest of tasks and actions in the project. This first definition of system requirements, together with the definition of the overarching architecture, APIs, and interfaces, will be the basis for the platform development being conducted during subsequent phases of the project (from WP4 to WP6). In this latter phase, and as mentioned above, UMU will have its strongest contribution leading WP4 in the commented technological plane. In WP3, UMU will contribute to researching main challenges and promising solution approaches to improve interoperability, especially between different first responders in different countries. Some relevant work will be following on resource federation and trusted information sharing (part of WP6). Finally, UMU will contribute in the system evaluation and demonstration (WP7) as part of the last phase of VALKYRIES, taking the *Demonstrator #1 (Spain-Portugal)* as the one where UMU will participate more actively, but will also contribute to the other two use cases.

Relative Expertise / Experience		
Field of expertise	Description of the expertise or experience related to this expertise	Added-value for the project
<b>Security, safety, trust, and privacy management</b>	Design and development of innovative models to calculate and assess trust and trustworthiness of security solutions when detecting cyber and safety threats in critical infrastructures, such as the ones happened during emergencies. Trust management and autonomous systems applied to highly critical settings, as well as privacy-preserving solutions when sharing data in multi-party scenarios (different first response teams, even from different countries).	Detect and anticipate cyber and safety threats, or even a combination of both, in cyber-physical networks and apply defensive actuations to mitigate them, as well as protect data sharing.
<b>Situational awareness</b>	Analytical analysis of the situation awareness, built from cyber and physical heterogeneous sensors deployed in critical infrastructures such as the ones happened in emergency settings.	Experience in situational awareness on cyber-physical systems with which to enhance them with better proactive, reactive and response capabilities to threats (whether kinetic or cyber).
<b>Artificial Intelligence</b>	Machine and Deep Learning techniques with the aim to enable self-organising capabilities and self-adaptive solutions for anomaly detection in cyber-physical networks.	Wide experience in AI applied to the detection of cyber and safety threats, with the aim of leveraging decision-making procedures for an enhanced anticipation and response to incidents.
<b>SDN/NFV (including 5G)</b>	Dynamic deployment and application of Virtual Security Functions (VSF) in order to facilitate self-protection capabilities by considering both users (e.g., first responders) and infrastructures.	Experience in the complete life cycle management that is required by the ETSI NFV platform, with the aim of deploying and instantiating VSFs that enable the emulation of emergency settings to test intermediate solutions obtained throughout the project.

#### Key Personnel's CVs

**Prof Dr Gregorio Martínez Pérez (male)** received a Ph.D. degree in Computer Science at the University of Murcia (Spain). In 1997 he started working in Computer Service of the same University on various projects on end-user products related to security and networking, and in 2014 he was appointed as Full Professor in the same department. His scientific activity is mainly devoted to cybersecurity, privacy and 5G networking, including security considerations, management models, network slicing and communication architectures. He is also working on the design and autonomic monitoring of real-time and critical applications and systems. He is working on different national (14 in the last decade) and European IST research projects (11 in the last decade) related to these topics, being Principal Investigator in most of them. He has published more than 160 papers in national and international conference proceedings, magazines, and journals. Prof. Martínez Pérez has been guest editing more than 30 special issues in different journals and magazines in the last few years. He is member of the editorial board of 16 journals, most of them related to the topics being covered in the project. He has already supervised 10 PhD students, several of them recognized with honours.

**Prof Dr Félix Jesús García Clemente (male)** received a M.S. and Ph.D. degrees in Computer Science at the University of Murcia (Spain). In 1999 he started to work on national and European IST research projects related to security and networking as research staff in the Department of Information and Communications Engineering of the University of Murcia. His scientific activity is mainly devoted to network management, interaction systems and cybersecurity. He is also participating in industrial initiatives involving sensor networking and tracking systems. Currently he is working on different national and European research projects related to these topics. As part of these projects he is collaborating with different universities, companies, and research centres. He has

published more than 100 papers in national and international conference proceedings, magazines, and journals. He was a visiting scholar at EPFL (Switzerland), NTU (Singapore) and Stanford University (US).

**Dr Manuel Gil Pérez (male)** is Assistant Professor in the Department of Information and Communication Engineering of the University of Murcia, Spain. His research primarily focuses on cybersecurity, including intrusion detection systems, trust management, privacy-preserving data sharing, and security operations in highly dynamic scenarios. He received a Ph.D. degree (Hons) in Computer Science from the University of Murcia in 2015. He is co-author of 70+ scientific publications in journals, magazines, and conference papers, and has supervised two PhD students in his postdoctoral career. He is an active member of different national and international research projects related to trust and security topics covered in the project, having recently held a postdoctoral fellowship funded by the Spanish National Cybersecurity Institute (INCIBE), operating as Security and Industry CERT in Spain.

**Dr Félix Gómez Mármol (male)** is Researcher in the Department of Information and Communications Engineering at the University of Murcia, Spain. His research interests include cybersecurity, privacy, Internet of Things, machine learning and bio-inspired algorithms. He received a M.Sc. (Hons) and Ph.D. (Hons) in computer engineering from the University of Murcia in 2007 and 2010, respectively. From 2010 until early 2017, he worked as researcher at NEC Laboratories Europe in Heidelberg (Germany). With 11 years of scientific career, he has published over 40 papers in top journals and conferences and has supervised two PhD students at UMU and 9 interns at NEC. He accrues 5 international patents and 2 open source projects and participated in 2 standardization bodies. He has a broad experience in research projects, having participated in 2 R&D contracts with private companies, 6 national projects and 11 European research projects, as well as having acted as expert evaluator both for European and national projects.

#### Relevant Publications, products, services

- A. Huertas Celdrán, M. Gil Pérez, I. Mlakar, J.M. Alcaraz Calero, F.J. García Clemente, G. Martínez Pérez and Z.A. Bhuiyan, **“PROTECTOR: Towards the protection of sensitive data in Europe and the US,”** *Computer Networks* 181:107448, 2020 [DOI [10.1016/j.comnet.2020.107448](https://doi.org/10.1016/j.comnet.2020.107448)]. A novel framework to protect sensitive data of EU and US citizens according to the rights demanded by EU/US data protection regulation laws.
- P.E. Lopez-de-Teruel, F.J. Garcia Clemente and O. Canovas, **“Practical passive localization system based on wireless signals for fast deployment of occupancy services,”** *Future Generation Computer Systems* 107:692-704, 2020 [DOI [10.1016/j.future.2017.09.022](https://doi.org/10.1016/j.future.2017.09.022)]. Design and development of a passive localization system that offers occupancy services in indoor locations by means of Machine Learning techniques.
- M. Gil Pérez, A. Huertas Celdrán, P.G. Giardina, G. Bernini, S. Pizzimenti, F.J. García Clemente, G. Martínez Pérez, G. Festa and F. Paglianti, **“Mitigation of cyber threats: Protection mechanisms in federated SDN/NFV infrastructures for 5G within FIRE+,”** *Concurrency and Computation: Practice and Experience*, SI on Cloud-Edge Computing and Communications, In Press [DOI [10.1002/cpe.5132](https://doi.org/10.1002/cpe.5132)]. Detection and mitigation of cyber threats in a federated testbed for 5G within FIRE+, by combining SDN and NFV technologies.
- A. Huertas Celdrán, M. Gil Pérez, F.J. García Clemente and G. Martínez Pérez, **“Policy-based management for green mobile networks through software-defined networking,”** *Mobile Networks and Applications* 24(2):657–666, 2019 [DOI [10.1007/s11036-016-0783-8](https://doi.org/10.1007/s11036-016-0783-8)]. Design and development of an energy-aware and policy-based solution to manage the network infrastructure at run-time dynamically by using policies.
- P. Nespoli, D. Papamartzivanos, F. Gómez Mármol, G. Kambourakis, **“Optimal countermeasures selection against cyber attacks: A comprehensive survey on reaction frameworks,”** *IEEE Communications Surveys and Tutorials* 20(2):1361-1396, 2018 [DOI [10.1109/COMST.2017.2781126](https://doi.org/10.1109/COMST.2017.2781126)]. Extensive survey analysing full-fledged frameworks, methodologies, and strategies able to offer near-optimal reaction in terms of countermeasure selection to restore system’s security environments.

## Relevant Projects / Activities / Initiatives

- **PALANTIR** (<https://cordis.europa.eu/project/id/883335>). Funded by EU (SEPT 2020-AUG 2023). PALANTIR aims at bridging the gap between large enterprises and SMEs/MEs, by providing multi-layered, infrastructure-wide threat monitoring, cyber-resiliency and knowledge sharing in a heterogeneous ecosystem, while at the same time being able to market these services to third parties in the form of Security-as-a-service (SECaaS). PALANTIR will implement a coherent privacy assurance, data protection, incident detection and recovery framework, focusing on the case of highly dynamic service-oriented systems, taking advantage of their inherent programmability features and abstractions.
- **5GZORRO** (<https://www.5gzorro.eu>). Funded by EU (NOV 2019-APR 2022). 5GZORRO (*Zero-Touch Security and Trust for Ubiquitous Computing and Connectivity in 5G Networks*) of the H2020 programme is proposing end-to-end security and trust solutions to secure communications across multiple domains, through novel design principles of i) AI techniques to enable cognitive processes able to self-adapt and self-react to changing conditions; ii) Distributed Ledger Technologies / Blockchain for implementing distributed security and trust across multiple stakeholders; and iii) the inclusion of cloud native technologies to achieve flexibility, scalability and resilience of SDN/NFV-based services for 5G.
- **SELFNET** (<https://selfnet-5g.eu>). Funded by EU (JUL 2015-JUN 2018). The SELFNET (*Framework for Self-Organized Network Management in Virtualized and Software Defined Networks*) project, from the H2020 5G PPP Phase 1, is proposing an autonomic management framework that can be applied to different networking and application scenarios, while putting special attention to the security and privacy of the data management flows through Machine Learning techniques.
- **SAFEMAN**. Funded by Spanish Ministry of Economy and Finance (JAN 2019-DEC 2021). SAFEMAN (*Unified Framework for Managing Cybersecurity and Safety for the Manufacturing Industry*) aims to design, develop, and evaluate a framework enabling the monitoring, identification and mitigation of cybersecurity and safety risks in realistic manufacturing industry scenario. The framework will take specific actions to protect workers and equipment by deploying the most adequate response and protection mechanisms to ensure the reliability and resilience of the industrial processes.
- **5G-CAGE** (<https://5ginfire.eu/5g-cage>). Funded by EU (DEC 2018-MAY 2019). The 5G-CAGE (*5G-enabled Context and Situational Awareness Detection with Machine Learning Techniques of City Objects in Experimental Vertical Instances*) experiment within the H2020 5GINFIRE project aims to deploy and test a City Safety solution in an experimental vertical instance, by using monitoring and analytics of video streams collected from heterogeneous and distributed sources in the Smart City. This project significantly contributes to generating impact to Smart Cities by enabling new Public Safety 5G services for citizens.
- **NATO IST-150 / RTG-072 (NATO Core Services profiling for Hybrid Tactical Networks)**. Funded by NATO, – (SEP 2016-OCT 2020). This project provides a set of profiles, including cybersecurity and privacy, which will help to deploy services as quickly and as well as possible. The set encompasses complete profiles for some services and partial profiles for others. The work is based on the Federated Mission Networking (FMN) documentation and specifications, which allows the results to be aligned with the FMN concept. This work aims to extend the support for services outside the scope of FMN to Hybrid Tactical Networks, while still retaining interoperability with FMN.

## Infrastructure and Technical Equipment

The University of Murcia (UMU) offers a test lab where part of the intermediate designs and developments of the project can be tested under emulation conditions, before being deployed in the actual demonstration tests. This first evaluation could be used as initial feedback for the design and development team of the VALKEYRIES project. UMU is having a blockchain framework in production, as well as an SDN/NFV testbed lab with two, compute nodes, an OpenDaylight SDN controller hooked into OVS instances, an ETSI MANO framework based on OpenBaton and OpenStack used as VIM, which could be used for prototype development. Through emulation using virtualised environments, it could be tested the intermediate results obtained during the project execution. Additionally, a parallel lab is also available in UMU for Machine and Deep Learning intelligent analysis with 3 GPUs, having around 7500 CUDA cores.



<b>Individual Exploitation Plan</b>	
<b>Exploitation Goals</b>	One of the main pillars of the UMU strategy is innovation, having end-to-end trust and privacy management, AI techniques and cybersecurity as part of its key lines of development. The knowledge transfer from R&D projects to national and EU companies is also key for the UMU team. Moreover, UMU will be also expanding the portfolio of Master and PhD courses used for CS and IT students as well as professionals willing to have access to the latest research and developments tendencies, in addition to how they can be applied into realistic scenarios such as the ones conceived in the VALKYRIES demonstrators.
<b>Topics/Domain</b>	<ul style="list-style-type: none"> <li>• The trust and privacy management in multi-party/stakeholder scenarios, and especially those made up of entities from different geographical and socio-political backgrounds.</li> <li>• Beyond pervasive mobile virtual services oriented to situational awareness on cyber-physical systems.</li> <li>• Security and safety procedures to forecast, detect and enforce countermeasures in a safety-critical communications landscape.</li> </ul>
<b>Approach and Activities</b>	UMU will be hiring a number of PhD students, postdocs and senior researchers working directly in the project and providing the required research insights towards the successful achievement of VALKYRIES objectives, in particular with regards to WP2, WP4 and WP7 in which UMU is having a key role. The results of these activities will end up with several publications (not less than 5) in top conferences and JCR-ranked journals and the defence of 1 PhD dissertation aligned with project objectives. UMU will also create one fully functional PoC (TRL 6-7) from its work in the project, which will be added to the strong portfolio of PoCs that UMU is having and using as a vehicle for knowledge transfer to its customers (national and European companies asking for personalised designs and consultancy).

<b>Individual Dissemination Plan</b>	
<b>Dissemination Goals and Target Groups</b>	UMU plans to disseminate the results obtained in VALKYRIES publishing them in venues with high scientific level such as top journals and conferences. They will also be disseminated with local stakeholders with which UMU has a collaboration relationship regarding transfer of research results from the University to private companies.
<b>Planed Activities</b>	<ul style="list-style-type: none"> <li>• Publication in top journals and conferences as dissemination activities.</li> <li>• Presentation of VALKYRIES results in workshops and EU events.</li> <li>• Active participation in EU activities and working groups, especially the ones related to data privacy, cybersecurity, safety, and network management.</li> </ul>
<b>Indicative List of Events</b>	IEEE Communications Magazine, IEEE Access, IEEE Transactions on Network and Service Management, ACM Transactions on Privacy and Security, European Conference on Networks and Communications (EuCNC).

#### 4.1.7. SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO S ANNA

<b>Partner Full Name</b>	SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO S ANNA		
<b>Short Name</b>	SSSA	<b>Country</b>	Italy
<b>Type</b>	Public Body; Non-profit; Research Organisation; Higher Education Establishment; Legal Person	<b>Website</b>	www.santannapisa.it

#### Official Logo



#### Brief Partner Profile

The Scuola Superiore Sant'Anna (Pisa, Italy) is a public university institute - with special autonomy - working in the field of applied sciences: Economics and Management, Law Sciences, Political Sciences, Agricultural Sciences and Biotechnology, Medical Sciences, and Industrial and Information Engineering. It is a special-statute university in Italy i.e. it has 'university status', being part of the process of Superior Graduate Schools in Italy (Grandes Écoles) or Scuola Superiore Universitaria.

As for its statute, the aims of the Scuola Superiore Sant'Anna (hereinafter “SSSA” or “Scuola”) are:

- To promote the development of culture, scientific and technological research, and innovation.
- To offer quality undergraduate, graduate, and continuing education.
- To ensure high-quality studies through the ongoing interaction of research and instruction.

The mission of SSSA is to pave innovative pathways in education and research, responding to the modernization and innovation of society itself. One of the main priorities of SSSA is internationalization, which regards both the curricula and research collaborations.

Permanent research and teaching staff are composed of 144 people, including full professors, associate professors, and assistant professors. In addition, PhD students, postdoc researchers, fellows contribute to the teaching and scientific aims of the Scuola.

The DIRPOLIS Institute is one of the 6 Institutes of the Scuola. It carries out innovative research in the fields of law, economics, and political sciences. This multidisciplinary approach allows a global representation of complex legal, political, social, and economic phenomena.

The DIRPOLIS's research activities are the result of studies conducted in 3 laboratories, including the LIDER-Lab (International and Comparative Law Research Laboratory), whose methodological approach is essentially comparative and interdisciplinary, and is related to empirical work and analysis. LIDER-LAB has a long tradition in theoretical and empirical legal research, training, and consulting on the relevant ethical and legal implications of new technologies in various sectors.

It has been focusing on these aspects from many different perspectives, such as privacy and data protection, risk management, also with the help of interdisciplinary contributions from physicians, engineers, and economists. Research activities on the topic strongly contribute to the national and international scientific debate.

Outputs include, firstly, numerous research and training activities addressed to undergraduate/graduate students as well as professionals coming from different educational and working backgrounds; secondly, scientific articles in peer-reviewed journals and chapters and books with recognized publishers; thirdly, the delivery of projects on similar subjects funded both at national and European level.

Furthermore, the large network of our organisation, together with the interdisciplinary environment of SSSA, will ensure a strong dissemination of project results.

In 2019 SSSA's Research Facilities, Infrastructure and Equipment have been evaluated together with the quality of research and teaching by Times Higher Education World University Ranking: SSSA ranked 1st



at the national level and 7th at world level of best young universities (under 50 years old) and 149th at the international level on a census of 1396 institutions.

It currently employs 144 professors (full, associate and assistant) and 340 PhD and 215 postdoc researchers (29% of which from overseas), and hosts in its premises 730 honour students. 39% of its courses are taught in English. SSSA has the highest ratio in Italy of patents per number of professors and researchers (192 active patent families), a research grants turnout of 18,1 million Euros, 96% of self-financed research, 68 active spin-offs, and, as of 2018, a portfolio of over 8.200 SCOPUS publications and over 5.200 WoS publications, with an H-index of 10292 (avg citations per article 15.3). In the H2020 programme, SSSA supervised 9 projects and co-worked on 55, for a total EU contribution of 19.7 million euros. SSSA is member of the European University Association, the European Consortium for Political Research and ProTon Europe.

The Institute of Law, Politics and Development (DIRPOLIS) of SSSA is involved in VALKYRIES through the **LIDER-Lab** (International and Comparative Law Research Laboratory). **LIDER lab** established in 2003, has a long tradition of both theoretical and empirical legal research, training, and consulting. It covers fields in private law and regulation at national, transnational, and international level. National and international research in the fields of fundamental rights protection, personal data protection, contracts, privacy, private law, and new technologies. One of the main research line, R.I.G.H.T.S. (Rights, Information, Governance, Health, Technology, Sciences), analyses the phenomenon of classification that emerges from big data and the use of analytics, considering that technologies enable unprecedented exploitation of information, being it small or big data, for any thinkable purpose, but mostly in business and surveillance with the ensuing juridical and ethical anxieties. In addition, ETHOS (EThics & law with and fOr ReSearch) research line investigates the ethical-legal issues emerging from the transformation of every scientific research into data-intensive research.

Within these research lines we are involved in SoBigData++ INFRAIA H2020 (SoBigData: Social Mining and Big Data Ecosystem) project and XAI ERC (Science and technology for the eXplanation of AI decision making). We also coordinate the H2020 MSCA-ETN [2021 LEADS project, aimed at training a new interdisciplinary professional figure we call Legality Attentive Data Scientist or LeADS, i.e. an expert in data science and law expected to work within and across the two disciplines, a leader in bridging scientific skills with the ethico-legal constraints of their operating environment. Under the IP research line, we currently coordinate the H2020 RIA ReCreating Europe “Rethinking digital copyright law for a culturally diverse, creative, accessible Europe” project. Furthermore, Scuola Sant’Anna’s large networks together with the interdisciplinary environment will ensure a strong dissemination of project results.

#### Role in Project

In VALKYRIES, SSSA will ensure the ethical-legal compliance of the developed technologies during the entire life cycle of the project **leading T1.5**. In particular, SSSA will analyse the applicable ethical-legal framework, perform the related impact assessments, and suggest the organizational and technical measures to ensure the transparent, fair, and lawful development of the VALKYRIES technologies.

Moreover, SSSA will contribute to the Management since it will be responsible for the development of a specific protocol for innovators to help a continuous and effective balancing of the needs to ensure the needed accountable and smooth flow of data and guaranteeing appropriate safeguards for fundamental rights and liberties.

Accordingly, SSSA’s expertise will lead to the publication of scientific publications in top ranked journals and domain specific conferences, possibly in Open Access. They will also be disseminated with local stakeholders, professionals, and new generations of data scientists and via a dedicated series of workshops in different countries. In detail, **SSSA will lead WP3** (and several tasks included in it). It will also **contribute** to T.1.1-1-4, T.2.4, T2.5, T.4.3-T4.5, T5.1, T6.2-T6.4, T.7.2, T7.4-T7.8

#### Relative Expertise / Experience

Field of expertise	Description of the expertise or experience related to this expertise	Added value for the project
<b>Standardisation and interoperability</b>	SSSA takes part on the national, EU, and international debates on standardisation activities on data protection and new technologies. In particular, SSSA members are: Consultative Member of the American Law Institute for Information Privacy, ethical-legal advisors for national and	The organisation of workshops to discuss the partial VALKYRIES outputs during the development of the project will ensure the highest level of standardisation and interoperability of the adopted solutions.

	international research projects (XAI, SoBigDATA++, etc.), external experts on data protection and ethics for H2020 funded projects, experts in working groups for national data protection officers in the universities, to name a few.	
<b>Data Protection And Ethics</b>	Innovative models to assess data protection as well as other ethical issues involved in VALKYRIES.	The data protection compliance of the project will produce new knowledge aiming at standardizing in Europe crisis management technologies. On the ethical side, SSSA will ensure that the development of crisis management technologies conforms to the highest ethical standards. It will guide partners in their work and provide input regarding ethics in all activities and involving the needed experts for each task.
<b>AI Regulation</b>	Innovative legal-ethical protocols based on the principle of explainability under article 22 GDPR will be applied to the VALKYRIES outputs.	SSSA will guide the development of a protocol specifically regarding crisis management technologies, with specific reference also on the processing of non-personal data.  The protocol will identify technical and organizational measures on the basis of specified identified risks in the given sector.
<b>IP</b>	Intellectual property schemes for new technologies, balancing incentives to innovate with accessibility and interoperability needs.	SSSA will guide the assessment related to the intellectual property hurdles to the achievement of sharing and interoperability objectives, highlighting the opportunities in this regard provided by the European IP normative framework.

#### Key Personnel's CVs

**Giovanni Comandé (male)** Full Professor of Private Comparative Law at Scuola Superiore S. Anna Pisa, Italy. Phd. SSSA, LLM Harvard Law School, Founder and **Director** of the LIDER-LAB ([www.lider-lab.org](http://www.lider-lab.org)). He has been visiting Professor Washington and Lee School of Law, USA (summer 2014); Université Laval (jan-nov. 2013; 2019-2020); Maastricht Univ. (2019; 2020) Fordham School of Law, (2012); Université Panthéon Assas Paris II, (2007); The Hebrew University (2005); Wake Forrest University School of Law, (Fall 2003); Yale Law School (1995 and 1997), teaching among other topics Comparative Electronic Business Law, tort, and Privacy. Professor Comandé was Jean Monnet Chair of Human Rights and Remedies for Personal Injuries in European Community Law: An Interdisciplinary Approach (1994-2001).

**Scientific director** of several research projects funded by the Italian Ministry of Instruction, University Science and Education, the Italian National Council of Research, the European Science Foundation, the European Union, the Canadian Ministry of Foreign Affairs Public Administrations, public and private companies and organizations.

**Director** of 2 top ranking law journals ("Opinio Juris in Comparatione" and "Rivista di Medicina Legale e del Diritto in Sanità) and Member of the **Editorial board** of several others in Italy and Colombia

He is **external scientific and ethical expert evaluator** for the EU Commission, National research Foundation – Research and Innovation Support and Advancement of South Africa, Latvia Ministry of Research, the University of Haifa (Israel); the Italian Agenzia Nazionale di Valutazione del Sistema Universitario e della Ricerca; The Hebrew University Jerusalem; the Fonds québécois de la recherche sur la société et la culture.

**Author** of 5 monographs, he has edited or co-edited 14 collective works, published more than 195 articles and notes published in major law reviews, and chapters to collective publications in Italian, English French, and Spanish. He is currently Consultative **Member** of the American Law Institute for Information Privacy ([www.ali.org](http://www.ali.org)); Member of the European Group on Tort Law for drafting Principles of European Tort Law (PETL); Member of the European centre for Law and Insurance ([www.ectil.org](http://www.ectil.org), Wien); Member of The European Law Institute (ELI) [www.europeanlawinstitute.eu](http://www.europeanlawinstitute.eu). He is member of the scientific board of the PhD in Data Science (<https://www.santannapisa.it/it/formazione/data-science>).

**Member** of the working group on the legal aspects of emergency-related data management, within the Task Force on data for the Covid-19 emergency (Italian Ministry for Technological Innovation and Digitalisation).

**Caterina Sganga (female)** (PhD. SSSA, LLM Yale Law School) is Associate Professor in Comparative Private Law at Scuola Superiore Sant’Anna (Pisa). Her main areas of expertise are European and international copyright law, IP and human rights and IP and access to knowledge. Prior to joining Sant’Anna, she was Associate Professor of Law at Central European University (CEU) Department of Legal Studies and CEU Business School, post-doctoral research fellow in Intellectual Property at SSSA, fellow at the Information Society Project at Yale Law School, and visiting researcher at the Centre for Intellectual Property Policy at McGill University (Montreal). Caterina held visiting teaching appointments at prominent EU universities. She is a member of ELI, ATRIP, EPIPI and ALPS. She is author of two monographs, several book chapters, and journal articles published, *inter alia*, on the major journals.

**Maria Gagliardi (female)** (PhD, University of Florence) is Associate Professor of Private Law at SSA. Her main research and teaching activities include insurance law and new technologies, tort law and several interactions of related topics, among which: damages for data protection law violations, protection of individual identity and discrimination in private law, data protection and insurance. She authored 1 monograph, co-authored one, edited 2 collective works and published more than 70 articles, notes, and chapters in collective bookds. She is also referee for several major law reviews.

**Denise Amram (female)**: PhD in Law, SSSA 2012. Denise Amram is currently affiliate researcher at [DIRPOLIS Institute](#), Scuola Superiore Sant’Anna Pisa and Data Protection Officer at Scuola Superiore Sant’Anna and Scuola Normale Superiore (Pisa). Since 2007 she serves as scientific collaborator at [LIDER Lab](#), where she contributes to the research and didactical activities on private law and private comparative law. ISO 11697:2017 certified as data protection officer (TUV), she also serves as legal-ethical advisor for research projects including sensitive data in several H2020 projects, also under the research line [ETHOS](#), that she coordinates, namely “EThics & law with H and fOr research”, also developed in collaboration with The BioRobotics Institute. Adjunct lecturer for several courses on Data Protection, Family Law, Private Law, Comparative Private Law at SSSA, she enriched her experience undertaking teaching and/or research activities both in Italy and abroad, including France (Université Panthéon-Assas and Université Panthéon-Sorbonne), The Netherlands (Utrecht University), Ireland (University College Dublin), Malta (University of Malta) and USA (Columbia Law School). Coordinator of the Permanent Observatory on Personal Injury Damages and co-coordinator of the Predictive Jurisprudence Project at Lider Lab at Scuola Superiore Sant’Anna, she authored / co-authored ~80 publications in Italian, French, English, and Spanish, including two co-editions and a book. Steering committee member for top ranked law journals (e.g. Rivista Italiana Medicina Legale e del Diritto in Campo Sanitario, Opinio Juris in Comparatione, Diritto dell’Internet, and GenIUS). Invited Speaker in several International and National Conference and Workshops. Her research

interests include data protection and privacy, private law and new technologies, fundamental rights protection

**Giulia Schneider** (female) is **research fellow** in private comparative law at SSSA and **PhD Candidate** in legal studies at Bocconi University, Milan. Her research focuses on the regulation of digital markets from the perspective of European Union law, with specific regards to data protection and intellectual property law.

She graduated cum laude from Sant'Anna School of Advanced Studies. She has published several papers in peer-reviewed journals and presented her research findings in international conferences both in Europe and the USA. She also carried out several researches stays at LSE (London), ENS (Paris) and ETH (Zürich). She holds a visiting fellowship at ETH in Zürich and at Max Planck Institute for Innovation and Competition in Munich. She is member of the editorial staff of the peer-reviewed open Access Journal *Opinio Juris in comparatione- Studies in comparative and national law* and of the Doctoral Student Editorial group of the journal *AIDA* (Annali italiani di Diritto d'Autore). She is **an Italian qualified lawyer** and **lecturer** at the University of Pisa.

#### Relevant Publications, products, services

- G. Comandé, Multilayered (Accountable) Liability for Artificial Intelligence, in “Liability for Artificial Intelligence and the Internet of Things”, Sebastian Lohsse, Reiner Schulze, Dirk Staudenmayer (Edts), pp 165-187, ISBN: 978-3-8487-5293-5, Hart Publishing Nomos (2019).
- G. Comandé, Regulating algorithms regulation? First ethico-legal principles, problems, and opportunities of algorithms (2017) in Tania Cerquitelli, Daniele Quercia, Frank Pasquale (eds) “Towards glass-box data mining for Big and Small Data”, Springer International, p. 169-207.
- G. Schneider, The Algorithmic Governance of Administrative Decision-Making: Towards an Integrated European Framework for Public Accountability (2019), in Eurojus- Special Issue Big Data and Public Law: New Challenges Beyond Data Protection, p. 126-140.
- D. Amram, The Role of the GDPR in Designing the European Strategy on Artificial Intelligence: Law-Making Potentialities of a Recurrent Synecdoche, *Opinio Juris in Comparatione*, 2020, 1ff.
- D. Amram, Building up the “Accountable Ulysses” model. The impact of GDPR and national implementations, ethics, and health-data research: Comparative remarks., *Computer Law and Security Review*, 2020, 37, 1 ff.

#### Relevant Projects / Activities / Initiatives

- **OPT-HEPAC**- (“Health Research 2018” call by the Tuscany Region). OPT-HEPAC – OPTIMISATION OF DIAGNOSIS AND CARE PATHWAYS FOR CHRONIC HCV IN TUSCANY is aimed to obtain optimal linkage to care and fast-track treatment initiation for HCV chronic infection patients by establishing common procedures and enhancing collaboration between treatment centres and the others SSR services
- **RECREATING EUROPE** - <https://www.recreating.eu/> (EU grant agreement No 870626; 2020-2022) – [2020 - 2022]. RECREATING EUROPE will deliver ground-breaking contributions towards a clear understanding of what makes a regulatory framework that promotes culturally diverse production and optimizes inclusive access and consumption.
- **LEADS** - (MSCA-ETN [2021-2025]). LEADS research and educational program trains a new interdisciplinary professional figure that we call Legality Attentive Data Scientist or LeADS. An expert in data science and law expected to work within and across the two disciplines, a leader in bridging scientific skills with the ethico-legal constraints of their operating environment. LeADS will develop a data science capable of maintaining its innovative solutions within the borders of law - by design and by default - and of helping expand the legal frontiers in line with innovation needs, for instance, preventing the enactments of legal rules technologically unattainable.
- **5GSOSIA** 5G-enabled SOS Intelligent Assistant (“Health Research 2018” call by the Tuscany Region), 2020-2023. To develop 5G-enabled SOS Intelligent Assistant (SOSIA) to provide an innovative system for improving not only the emergency response but also the personalized healthcare delivery to patient. The envisioned system is based on novel device for assisting emergency first rescuer and on an artificial intelligence-based patient dispatching in the emergency centres
- **SOBIGDATA++** - (EU grant agreement No 871042; 2020-2023). SOBIGDATA++ strives to deliver a distributed, Pan-European, multi-disciplinary research infrastructure for big social data analytics,



coupled with the consolidation of a cross-disciplinary European research community, aimed at using social mining and big data to understand the complexity of our contemporary, globally-interconnected society.

#### Infrastructure and Technical Equipment

Library facilities, access to the international databases, and interdisciplinary networking due to the ongoing projects make the LIDER Lab the perfect environment where to develop the assigned tasks.


#### Individual Exploitation Plan

<b>Exploitation Goals</b>	A Data Management Platform which includes a tool to manage information regarding cross-border crises is envisaged and offered as a service. The knowhow developed along with the DaMP will create the premises for a start-up to be a spin-off of SSSA for its exploitation.
<b>Topics/Domain</b>	Data protection law, IP, law, and technology
<b>Approach and Activities</b>	The developed protocols and guidelines will be adapted to other sectors for further technology transfer. This will be the task of a dedicated spin-off company to bring to market the products/services in an appropriate way.

#### Individual Dissemination Plan

<b>Dissemination Goals and Target Groups</b>	SSSA will include VALKYRIES outputs and methodologies in training activities and classes addressed to professionals and stakeholders, as well as classes and seminars addressed to undergraduates and PhD programs both in Law and Data Science. SSSA will disseminate the VALKYRIES output to a wider academic and professional audience with a workshop dedicated to the ethical, legal, and societal aspects (ELSA) addressed in the project. SSSA will also reach out to the wider public through periodic press releases and social media posts describing the progresses of the project.
<b>Planned Activities</b>	<ul style="list-style-type: none"> <li>• Incorporation in existing and new curricula</li> <li>• <i>Opinio Juris in Comparatione</i> is an electronic open access journal devoted to studies in comparative and national law. VALYRIES will enquire the legal aspects related to the enquired crisis management scenarios, taking advantage of the journal's international character and its openness to publication in several languages.</li> <li>• Ethical-Legal VALKYRIES Workshops (M6, M12, M18, M24) will be organised in order to sensitize on the ethical-legal framework in the VALKYRIES context and to discuss the progress on the development of the protocol within the stakeholders. The same workshop will be taken in VALKYRIES in order to reach the widest number of stakeholders</li> <li>• Joint dissemination events with SoBIgData++, LEADS, ReCreating Europe (H2020 funded projects)</li> </ul>
<b>Indicative List of Events</b>	<ul style="list-style-type: none"> <li>• Special issue in <i>Opinio Juris in Comparatione</i> (international open access journal)</li> <li>• Computer Privacy and Data Protection is the leading annual conference on privacy and data protection. VALKYRIES aims at regularly holding panels to publicly discuss its advances and main issues.</li> <li>• Ethical-Legal VALKYRIES Workshops (M6, M12, M18, M24)</li> </ul>

#### 4.1.8. NOVOTEC

Partner Full Name	NOVOTEC CONSULTORES S.A.		
Short Name	NOVOTEC	Country	Spain
Type	International & Private Company	Website	<a href="http://www.novotec.es">www.novotec.es</a>
Official Logo			
			
Brief Partner Profile			
Novotec is belonged to Applus Group a large company that have four bid Division, with different activities, like: <ul style="list-style-type: none"><li>ENERGY &amp; INDUSTRY DIVISION. - Industrial and environmental inspection, technical assistance, non-destructive testing (NDT), and environmental inspection, quality assurance and quality control, engineering and <b>consultancy</b>, vendor surveillance, <b>certification and asset-integrity services</b>.</li><li>LABORATORIES DIVISION. - Industrial testing laboratories, engineering, <b>certification</b> and metrology services.</li><li>AUTOMOTIVE DIVISION. - Statutory vehicle inspection services for safety and emissions.</li><li>IDIADA DIVISION. - Proving ground, design, engineering, testing and homologation services.</li></ul>			
Role in Project			
Leadership in work package 2 on standardization and harmonization, and collaboration in the definition of procedures in different WPs of the VALKYRIES project. NOVOTEC will be leading the whole standardization and regulation strategy of the project based on a 4-steps process detailed in section 2 of the proposal and agreed by project participants.			
Relative Expertise / Experience			
Field of expertise	Description of the expertise or experience related to this expertise	Added value for the project	
Consultancy Services for Certification / Knowledge of normative development/ Certification services/ Procedures Development	<p>NOVOTEC CONSULTORES is a private company dedicated to standardization, harmonization of procedures in all types of public and private organizations.</p> <p>The consulting services design, develop and implement the necessary requirements for compliance with the standards, regulations, with special attention to the evaluation and compliance with the legal requirements applicable.</p> <p>In addition, NOVOTEC has a series of business units that develop accredited inspection and certification services. These inspection services include, but are not limited to, regulatory inspection services; testing of materials, products; verifications of conformity of products and services; third party testing and inspection.</p>	<ul style="list-style-type: none"><li>Knowledge of the normalization, certification, and standardization schemes of processes.</li><li>Knowledge of the development of procedures to adjust them to the corresponding references.</li><li>Knowledge of the processes of design, definition, implementation of regulatory requirements.</li><li>Knowledge of the reference evaluation auditing, and conformity processes.</li><li>Knowledge of the training, qualification, and training processes of the applicable regulatory requirements.</li></ul>	
Key Personnel's CVs			
<p><b>Angel Gimenez Celdran (male)</b> is a Graduate in Pharmacy, Master in Quality Management, Quality Engineer by ASQC, 27 years of experience in quality and environmental management consulting, business organization. Extensive experience in coordinating consulting staff and consulting projects. Actually, is Manager of Consultancy Services in Spanish east area, at NOVOTEC CONSULTORES (Applus Group). Since 1993 he has been developing projects as a consultant specialized in quality issues, <b>standardisation, normalization and harmonization</b> , and since 1998 he has also participated as Head of Consulting Projects for the planning, coordination and monitoring of consulting teams of different specialties, and since 2004 he has been combining</p>			

the functions of Head of the Consulting Department of the Valencian Community, Region of Murcia, and the Balearic Islands, with currently a team of 19 consultants under his charge who develop environmental and quality consulting projects in different sectors and clients. He is responsible for providing both human and material resources and maintaining the appropriate information channels, in order to keep the Contract Management and other involved managers informed at all times, in reference to all those aspects that have an effect on deadlines, quality, safety and health etc. Likewise, it is responsible for having the initiative to anticipate incidents in the service, in such a way that studies and procedures can be prepared to process the documents necessary for their resolution.

**Isabel Dominguez Perelló (female)** is Agronomist engineer and Graduate in Environmental Sciences from the Polytechnic University of Valencia. Actually, Project Manager at NOVOTEC (Applus Group) for consultancy services. 20 years of experience in Environmental Consulting developing jobs as a Consultant; 18 years conducting EMS Audits; 13 years of experience coordinating environmental projects as Project Manager. Main types of projects developed include design, implementation, and audit of the Environmental Management System based on ISO 14001 and EMAS Regulation, and other references such as Energy Management Systems according to ISO 50001; carrying out environmental diagnoses and audits of compliance with environmental legislation; environmental Risk Analysis; preparation of projects related to obtaining environmental permits such as Environmental Impact Studies, Integrated Environmental Authorization projects, acoustic studies, soil reports, etc.; projects related to greenhouse gas inventories, calculation of the carbon footprint; environmental monitoring on site; preparation of sustainability reports; development of sustainable mobility plans; training and awareness courses on various environmental issues; coordination and development of European projects in the LIFE and ERASMUS + calls.

**Jose Damian Tellez (male)** is a Superior Industrial Engineer. Mechanical Specialty. Master of Higher Technician in Occupational Risk Prevention. Twenty-three years of experience at NOVOTEC (Applus Group), now is Project Manager, and Specialist in process management, IT consulting, strategic planning, situation diagnostics, improvement, and implementation of organizational management systems (Quality, R & D & I, PRL and EFQM Excellence Model). Specialist in management and financing of R + D + i projects

As leader of Innovation at Novotec, he has extensive experience in the implementation of business IT solutions, in advising on the definition and implementation of R & D and Innovation Management Systems, in the definition and implementation of surveillance systems technology, in the Certification of R + D + i Projects according to the UNE 166001 Standard and for tax purposes thereof. He also has extensive experience in Energy Consulting and Supply Efficiency, Municipal Accessibility Plans, EFQM Self-Assessments and Drafting of Memories of Excellence, Implementation of the LOPD and training projects related especially to the Tourism Sector. He has participated in many projects for the design and implementation of regulations, standardizing and harmonizing the standards required by customers.

**Alicia Tena Fresneda (female)** is a Project Manager in the Industry Consulting Department at Novotec. Senior Agronomist Engineer from the UPM. Master in organization, production management and logistics through the training programs of the Community of Madrid, and Master in eco-auditing and business planning of the environment taught by the Institute of Ecological Research, with complementary training in Quality. More than 26 years of experience in Novotec, mainly dedicated to consulting Improvement Projects. Example of projects Alicia has been involved are the preparation of the Global Risk Map for Gas Natural Fenosa (Naturgy act), designing the risk analysis and evaluation methodology in all its facilities, as well as the computer tool for digitization. Design and documentation of a Management System for PCI (Fire Protection) in Naturgy, through which the Fire Protection Criteria, specific to the organization, are defined, participating in its international dissemination and training process. He has led a safety observatory that involves the identification and publication facilitating the dissemination of lessons learned, as well as the monitoring of industrial accidents in the Company.

**Berta Ayuso Alía (female)** is a Project Manager for Healthcare Sector in the Consultancy and Environmental Unit of Novotec Consultores S.A., is in charge of the commercialisation, leading, management and proper development of projects. She has a **Pharmacy degree** provided by the Complutense University of



Madrid and has also completed specific training on quality matters through the **Master in Quality Management and Business Excellence** at the Escuela de Organización Industrial in Madrid. She has completed as well the **Master in Business Administration and Management at healthcare providers** organised by the Pompeu Fabra University – Fundación Gaspar Casals in Barcelona. She is certified as EOQ Quality Systems Manager in Healthcare and EOQ Corporate Social Responsibility. Both certificates have been issued by the Asociación Española de la Calidad (according to the certification process of the European Organization for Quality – EOQ). She has been working for 23 years providing consultancy services for public and private companies. Nowadays, she leads and executes services for management improvement and organization effectiveness, developing different types of projects: definition of strategy, analysis and process improvement, implementation of different requirements such as ISO 9001, 17025, etc., business balanced scorecard development, customer satisfaction and expectation measurement, assessments based on EFQM Excellence Model and corporate social responsibility projects, among others. She has developed a set of projects for the definition and establishment of referential and standards through the analysis of the related processes, sources of information and legal basis, expert opinion and stakeholders and using qualitative and quantitative consensus techniques. The established set of referential have been used for process harmonisation and standardisation and for further assessment and identification of areas for improvement.

**Luz Moreno Sánchez (female)** is a **Quality Consulting Manager for Public Administration Sector** at Novotec Consultores (ApplusGroup) is in charge of the commercialisation, leading and development of the projects carried out for customers in such sector. She has a **Psychology degree** and has attended specific training in quality through the **Master in Science of Quality Management** provided by the **Linconshire University y ESIC**. She also has a Master in Individual and group relations within organisations provided by the Tavistock Institute of Human Relations in London. She is founding member of **AECOP** (Asociación Española de Coaching y de Consultoría de Procesos). She has a **License to provide training and support based on EFQM Model** (License Number CEG/17/RDEX/54). She has been working in **Novotec**, Company of Applus, for 20 years leading and participating in different projects of standardisation, development and implementation of processes and procedures, among others (Data protection – GDPR/LOPDGDD, Information Security, customer satisfaction, employee experience, training in leadership, awareness and team development, EFQM assessment, etc). In relation to emergencies and disasters, she has been the **project manager and has participated in the Agencia de Seguridad y Emergencias Madrid 112 for the maintenance of the Integrated Quality and Emergency Management System**, including the development of internal audits and support in the management processes (definition of policies, organization context review, risk and opportunity management, analysis of information and data, indicators follow-up, definition and implementation of Action Plans, etc). **The analysis and adequation of the provided service to the National Security Scheme and ISO/IEC 27001 requirements**, including the development of the Security Policy, identification and validation of assets, risk management, definition of plans to address the identified risks, development of security procedures and support for the external audit and the development of the related corrective action plan.

**Manuel Avila Sanchez (male)** is currently finishing PHD in Analysis of Social Problems at the National University of Distance Education (UNED). Graduated in Sociology (UNED). Course in Specialization in Employment and Local Development (UNED). Industrial Technical Engineer specializing in Mechanics at the University of Jaén. Six years of experience in NOVOTEC as Technician and Coordinator of Research Projects, Analysis of Productive Sectors, Analysis of Master Plans, Implementation and Monitoring of Management by Processes in Institutions and Collaboration in Environmental Projects. Research experience through a 7-month internship in New York, where I analysed the American educational system within the Education Office of the Consulate General of Spain in New York; and scholarship of 6 months in France.

**Esther Sánchez Cabezas (female)** is Consultant at NOVOTEC CONSULTORES (Applus Group). Has been developing a project at **European Union Agency for Railways 2012 - 2019**. Design, development, and implementation of an Integrated Management System within the Agency, considering ISO 9001:2015 requirements and EC Internal Control Standards. She has been giving continuous support to the Agency staff on process management matters, including the standardisation of railway requirements for improving their interoperability; the development of the certification programme for EU harmonization; and the provision of training on the Integrated Management System and on internal audits.

#### Relevant Projects / Activities / Initiatives

1. **U-MOV LIFE 15 GIC/ES/000056**, founded by European Commission, and budgeted of 1.329.427 Euros, 2016-2021. He has developed the function of general coordinator (and consortium coordinator) throughout the project, where NOVOTEC is the leader. Project Subject: Creation of a European network of good environmental practices of sustainable mobility in universities.
2. **ECVET-LAB** founded by European Commission ERASMUS +, and budgeted of 215.043 Euros, 2016-2021 He has developed the function of general coordinator throughout the project, where NOVOTEC is the leader. Project Subject: Development of a specific qualification training of expert in environmental management of laboratories.
3. **AB CLEAN, Making the EU clean of asbestos**” founded by European Commission (EUROPEAN COMMISSION EDUCATION, AUDIOVISUAL & CULTURE EXECUTIVE AGENCY (EACEA)) Leonardo Da Vinci, and budgeted of 528.761 Euros, 2013-2015. He has developed the function of general coordinator throughout the project, where NOVOTEC is the leader. Project Subject: development of content and basic qualification for environmental management and workplace risk prevention for asbestos.
4. **KPT (Karachi Port Trust)** design and implementation of ISO 14001 & OHSAS 18001. Project tendered and funded by the World Bank. . 2013– 2016. Project Subject: Design, implementation of the requirements related to ISO 14001 environmental management regulations and OHSAS 18001-health and safety management in all activities of the Karachi Port Authority.
5. **Verification of Conformity (VoC) for the kingdom of Morocco.** 2020.  
Applus has been authorized by the Ministry of Industry, Investment, Trade and Digital Economy (MICEVIN) for the implementation of the Verification of Conformity (VoC) for products imported to the Kingdom of Morocco.
6. **European Union Agency for Railways 2012 - 2019.** Design, development and implementation of an Integrated Management System within the Agency, taking into account ISO 9001:2015 requirements and EC Internal Control Standards.
  - Continuous support to the Agency staff on process management matters, including:
  - the standardisation of railway requirements for improving their interoperability;
  - the development of the certification programme for EU harmonization.
  - Provision of training on the Integrated Management System and on internal audits.
7. **Transplant Child European Reference Network** project coordinated by La Paz University Hospital and grouping up to 18 healthcare providers (members) from 11 Member States of the European Union. In this project, she has participated in the definition of a long-term strategy with the related key objectives for outputs and outcomes achievement, the development of action plans focused on healthcare, training, research, clinical guidelines, quality and monitoring, knowledge sharing and networking, including communication, and the coordination and control of aligned work and task development, among others.
8. **Analysis and evaluation of patient safety indicators and the definition and development of an audit manual for the multimodal evaluation of patient safety performance in the different Autonomous Regions of Spain.**
9. **IHAN (Iniciativa para la Humanización de la Asistencia al nacimiento y la lactancia).** Based on WHO and UNICEF baby-friendly hospital initiative requirements, she participated in the definition, harmonization and standardization of the requirements for pregnant women care and breastfeeding promotion. Since then, she is carrying out Hospital and first healthcare centre assessments as certified assessor for the IHAN.
10. **The maintenance of the Integrated Quality and Emergency Management System**, including the development of internal audits and support in the management processes (definition of policies, organization context review, risk and opportunity management, analysis of information and data, indicators follow-up, definition and implementation of Action Plans, etc).
11. **The analysis and adequation of the provided service to the National Security Scheme and ISO/IEC 27001 requirements**, including the development of the Security Policy, identification and validation of assets, risk management, definition of plans to address the identified risks, development of security procedures and support for the external audit and the development of the related corrective action plan.

### Infrastructure and Technical Equipment

The main infrastructure to be used in the project will be the offices that in Spain are situated in the main cities, and in more than 60 countries. Our big offices are located in Madrid, Barcelona, Sevilla, Coruña, Valencia, and Bilbao. Every office have all the necessary facilities to work, training rooms, adequate printing and communication media.

### Individual Exploitation Plan


<b>Exploitation Goals</b>	NOVOTEC will aim to define process standards, promote, and develop normalization, and facilitate harmonization as the main results of the VALKYRIES project.
<b>Topics/Domain</b>	SOP, STANDARITATION, NORMATIVE, HARMONIZATION
<b>Approach and Activities</b>	<p>NOVOTEC pays particular interest in the design and develop pre-normative, normative and standardisation in order to organize and improve with</p> <p>Development of standardization, normalization, and harmonization processes, will allow collaboration and development of disaster plans for many public and private organizations, with the appropriate requirements and infrastructures to be able to implement a better level of protection and disaster prevention.</p> <p>Standardization and normalization will provide solid references to develop coordinated action protocols with any entity that needs to plan for potential disasters.</p>

### Individual Dissemination Plan

<b>Dissemination Goals and Target Groups</b>	<ul style="list-style-type: none"> <li>• Workshops presentations with related stakeholders (SME, institutions, large companies, and regulators) and experts</li> <li>• Local/EU related standardization committees in which VALKYRIES contributed</li> <li>• Leaflets, scientific papers, project presentations, posters, newsletters, demos/ Private and public forums/events attended by cyber-defence practitioners, VALKYRIES workshops, project demonstrations, website, Social Media</li> <li>• Workshops will be organized in parallel to the VALKYRIES' ethical-legal, closing the external stakeholders related with regulation, standardization, certification and harmonization to the Consortium activities. Their main targets will be to discuss the opportunities and progress on the aforementioned actions and getting close to the ongoing/planned Pan-European efforts (institutes, agencies, etc.) and working groups and end-users.</li> </ul> <p>Main objective: to disseminate and discuss VALKYRIES results on the regulation, standardization, certification, and harmonization issues towards raise awareness of the project results and get alignment with European and International actions</p>
<b>Planed Activities</b>	<p><b>Standardization VALKYRIES Workshops (M6, M12, M18, M24)</b></p> <p>These workshops will be organized in parallel to the VALKYRIES' ethical-legal, closing the external stakeholders related with regulation, standardization, certification and harmonization to the Consortium activities. Their main targets will be to discuss the opportunities and progress on the aforementioned actions and getting close to the ongoing/planned Pan-European efforts (institutes, agencies, etc.) and working groups and end-users.</p> <p><b>Main objective:</b> to disseminate and discuss VALKYRIES results on the regulation, standardization, certification, and harmonization issues towards raise awareness of the project results and get alignment with European and International actions.</p>



#### 4.1.9. BLOCKCHAIN2050 BV

Partner Full Name	Blockchain2050 BV		
Short Name	BC2050	Country	The Netherlands (NL)
Type	SME	Website	<a href="https://www.blockchain2050.io">https://www.blockchain2050.io</a>
Official Logo			
			
Brief Partner Profile			
Blockchain2050 BV is a dynamic Dutch SME that implements the latest improvements in Blockchain technology into secure and innovative solutions. The team of Blockchain2050 BV includes highly ranked IT security personnel and experts in Cybersecurity and Blockchain technologies with many man-years of experience in relevant international projects and works cooperating with international organizations and governmental agencies and private entities. Blockchain2050 BV has already participated in several submitted H2020 proposals by providing technical contribution in order to scale up solutions with the use of a standard open source implementation that allows the communication with various smart contracts on the Ethereum, Openchain, Multichain or similar platform and provide the needed transparency.			
Role in Project			
BLOCKCHAIN2050 BV, as an experienced integrator of ICT and Cybersecurity technologies, will contribute to the project by participating in the development of Blockchain and DLT solutions that will support the VALKYRIES project.			
Relative Expertise / Experience			
Field of expertise	Description of the expertise or experience related to this expertise	Added value for the project	
Development of Blockchain solutions	BC2050 develops blockchain and DLT solutions, based on several public, private, and/or permissioned blockchains.	Blockchain technology provides transparency, immutability, and traceability of all involved data.	
Key Personnel's CVs			
<b>Mr Peter Tjia (male).</b> Peter received his bachelor's in business administration from Erasmus University. Then he focused his professional education to Law & Security studies and became a Risk Security Expert from DHM Security Institute and continued his further studies on Information & Security subject in the Institute for International Research. Since then he had the role of Business Development in several companies like XEROX, D&B, DFW etc. and he worked as Business Security Manager in ADT for Benelux, in TYCO and BCOM. Thereafter he was Senior Business Developer for Safety & Security at Innovation Quarter, West Holland, and since 2015 he is cofounder and Business Orchestration Officer for the Smart, Safe & Resilient Mainports multi-year program for South Holland province. Recently he became CEO of Blockchain2050 BV.			
<b>Dr Panayiotis Christodoulou (male).</b> Panayiotis holds a PhD in Computer Engineering and Informatics from the Cyprus University of Technology (CTU). He completed his undergraduate and postgraduate studies at the Manchester University, UK (MEng) and the Frederick University, Cyprus (Msc). He is a member of the Software Engineering and Intelligent Information System Research Lab (SEIIS) located at CUT and his interest are focused mainly in the area of Software Engineering and more particular, in Recommender Systems and Blockchain Technologies, as well as in techniques and mechanisms of Artificial and Computational Intelligence. He has an extensive experience in developing smart contracts on various platforms and managing blockchain projects.			
Relevant Publications, products, services			
<ul style="list-style-type: none"><li>LogChain Supply chain management solution for providing transparency, decentralization, and security.</li><li>Blockchain2050 Files' Authentication Manager Application for signing and authenticating verifying documents and securing the transactions</li></ul>			

- Metablockchain (US patent technology) Novel Blockchain environment that offers an application generator designed to support developers of Blockchain based information systems.

#### **Relevant Projects / Activities / Initiatives**

- Tap2sos application (Documentation and retrieval of medical data)-Private project
- Decentralized online marketplace using cryptocurrencies- Private project
- Satfotos (Satellite imagery marketplace using cryptocurrency)- Private project
- Doctor Cloud -Blockchain solution that connects interactive medical identification bracelets with any e-Health EMR platform-Private project Infrastructure

#### **Infrastructure and Technical Equipment**

- Blockchain Private Network based on Hyperledger.



#### 4.1.10. BULGARIAN DEFENCE INSTITUTE

<b>Partner Full Name</b>	<b>BULGARIAN DEFENCE INSTITUTE "Professor Tsvetan Lazarov"</b>		
<b>Short Name</b>	BDI	<b>Country</b>	Bulgaria
<b>Type</b>	Research	<b>Website</b>	<a href="https://www.di.mod.bg/en/defence-institute">https://www.di.mod.bg/en/defence-institute</a>
<b>Official Logo</b>			
			
<b>Brief Partner Profile</b>			
<p><b>The Bulgarian Defence Institute (BDI) "Professor Tsvetan Lazarov"</b> was established by a decree of the Council of Ministers of the Republic of Bulgaria #140 of 04.06.2009 as the main scientific-research structure at the Bulgarian Ministry of Defence.</p> <p>The key areas of activities of BDI are: First of all, scientific and applied research, development and experimental design activities in the area of C4ISR Systems, Armaments, Strategic security studies; Defence technology foresight; Human Factors in Defence and Security, CBRNE, Logistics, Equipment and Materials. Also, BDI supports the Integrated Project Teams through participation in the preparation, scientific monitoring and complete implementation of the defence programs and projects. Furthermore, an important function of BDI is the education of PhD students in nine accredited doctoral programs. Besides, the Institute supports the activities of the Armaments Council and the Defence Capabilities Council of the Bulgarian MoD, as well as the international and national cooperation in the area of research, development, testing and certification of defence products in the frameworks of NATO, the European Union, as well as on bilateral basis. Additionally, BDI is responsible for the development of technical specifications, programs and testing methods, as well as standardization and other documents, related with the acquisition of defence products; Certification of Quality Management Systems of the Bulgarian Armed Forces under NATO Standards, guaranteeing of the quality and assessment of the compliance during the process of acquisition of defence products. As well, BDI is supporting the process of ensuring air safety and flying suitability of the military aerial vehicles, as well as of the aerial vehicles of the Ministry of the Interior. Last but not least, BDI is in charge of the coordination of the national contribution to NATO Science and Technology Organization and the European Defence Agency.</p> <p>The BDI has broad experience in managing and implementing national and international research projects on defence and security topics funded by the European Commission, European Defence Agency, NATO, and national institutions. Also, as the main scientific-research structure at the Bulgarian Ministry of Defence, BDI coordinates the activities in the framework of the European Defence Agency and NATO Science and Technology Organization. Furthermore, BDI has established very good national and international scientific cooperation, cooperating with about 50 scientific organizations and business structures, including the Bulgarian Ministry of Interior and the NATO Centre of Excellence "Crisis Management and Disaster Relief" stationed in Sofia, Bulgaria. BDI has established Memorandums for cooperation with both institutions regarding participation in joint EU and NATO funded projects. The knowledge and skills developed during the implementation of these research activities will guarantee successful completion of the project.</p>			
<b>Role in Project</b>			
<p>BDI will lead WP 6, the two of the tasks T6.2 and T6.4, as well as T7.7 Bulgarian – Greece use case of VALKYRIES. Having in mind the expertise of the research staff, we will contribute with experts in the areas of Information and communication technologies, social sciences, chemical, biological radiological and nuclear agents, explosions and their impacts and standardization. More precisely, BDI will support the development of System Requirements, Concepts of Operation, and demonstrators. Second, BDI will actively participate in the Education and Training for first aid responses. Third, BDI can contribute to Raising practitioner and social awareness. Fourth, BDI will lead the study of Civil-Military Cooperation in crisis management and disaster relief. Finally, BDI will take the lead of the Demonstrator #3 Bulgaria – Greece.</p>			



Relative Expertise / Experience		
Field of expertise	Description of the expertise or experience related to this expertise	Added value for the project
Information and communication technologies	BDI is in charge of the following activities in ICT domain: First, scientific research, applied and experimental design-related work in the area of C4ISR systems and information technology for defence. Second, implementation of research projects, technical specifications, testing programs and methodologies related to the development of the Bulgarian Armed Force's C4ISR systems and information technology for defence. Third, scientific technical expertise the activities for design and construction of integrated communication and information systems for management of the country and the Armed Forces. Fourth, cooperates in the field of applied research and technology, testing, and certification of C4ISR systems within NATO, the European Union and on a bilateral basis.	The Directorate "Development of C4I Systems" can support the process of VALKYRIES C2 system design, development, and testing.
Social sciences	Organisation of field studies, interviews, Subject Matter Experts assessment, analysis of public perceptions regarding security risks, analysis and measurement of factors influencing interagency and international civil-military cooperation in crisis management operations, the study of the factors of societal resilience in case of crises	Contribution to tasks related to the study of civil-military cooperation and Ethical, legal, and societal framework; Investigation of key challenges; and promising solution approaches to improve interoperability.
Chemical, biological radiological and nuclear agents	Expertise in the area of CBRN covering production, properties and characteristics, means and methods of use, means and methods of detection and identification, technical means and procedures for protection and decontamination, as well as means for warning and reporting and related procedures.	Contribution to tasks related to study in the area of CBRN events and civil-military interoperability and cooperation.
Explosions and their impacts	Expertise in the area of explosions and their impact covering production, properties and	Contribution to tasks related to study in the area of blast-related events and their impacts.

	characteristics of energetic materials, means and methods of their use, means and methods of detection and identification, technical means and procedures for protection and mitigation of explosions and their impact, as well as post-blast evaluation and related procedures.	
Standardisation	BDI is the MoD structure responsible for the development, coordination, approval, registration, distribution, storage, and update of military standardization documents. Besides, BDI organises and coordinates the process of ratification, approval and implementation of NATO standardization documents and maintains STANDARD information system. Also, BDI coordinates the cooperation in the field of military standardization within NATO, European Union and on bilateral basis.	One of the directorates of BDI, "Military Standardization, Quality and Certification" can support the research activities in the standardisation domain.

#### Key Personnel's CVs

**Col. Assoc. Prof. Dr Nikolai Stoianov (male)** is deputy director of the Bulgarian Defence Institute. He is well experienced in the development of information systems with the different designation, many of which are already brought into use in the Bulgarian Armed Forces. He is specialized in the sphere of Information Security and as such is involved in the European Projects on the FP7 "INDECT", "HOMER", H2020 "GaP", "ROBORDER", "CAMELOT", EDA "SPIDER" and "PYTHIA", and NATO SPS "CyRADARS. He is member of the external advisory group of FP7 project "PANOPTESEC". Col. Nikolai Stoianov is Principal NATO Science and Technology Board member for Bulgaria, Vice Chair of NATO STO IST Panel and he is member of "Future concepts and tools for Cyber Defence", "Cyber Defence Situational Awareness", "Defence Implications of Cloud Computing at Tactical Edge", "Cyber Attack Detection, Forensics and Attribution for Assessment of Mission Impact", "Visual Analytics (Cyber Security)", "Intelligent Autonomous Agents for Cyber Defence and Resilience", and Research Lecture Series Director on "Cyber Security Science and Engineering". Dr Stoianov has more than 80 published paper in national and international scientific conferences and journal, he is author and co-author of four books in the field in information security. The project managing experience of Dr Stoianov consists of: Project coordinator for Bulgaria of EDA „Predictive methodology for Technology Intelligence Analysis (PYTIA) Project, 2018-2019; ECHO: European network of Cybersecurity centres and competence Hub for innovation and Operations, H2020 -2019-2023 where he is WP leader and Scientific and Technical coordinator; SOLOMON "Strategy Oriented anaLysis Of the Market fOrces in EU defence", EDA Project, Preparatory Action on Defence Research programme, PADR-STF-2018 (Strategic Technology Foresight) call, and PADR-STF-02-2018 topic, 2018-2021, Project coordinator for Bulgaria of "Mediterranean practitioners' network & capacity building for an effective response to emerging security challenges" (MEDEA) Project H2020, 2018-2023; Project coordinator of the national project "Military Messaging System X.400" from 2007-2010. WP6 leader of FP7 HOMER project (2013-2016); WP2 leader of EDA SPIDER project (2016-2017), WP4 leader of EDA PYTHIA project, 2018-2019, Project coordinator of NATO SPS CyRADARS project (2018-2020)., External Advisory Board member of FP7 Project PANOPTESEC (2013-2016); Lecture series director for NATO STO research lecture series on "Cyber Security Science and Engineering" (2016-2019).

**Captain (BGR-N) (ret.) Yantsislav Yanakiev (male)** is a full professor in sociology at the Bulgarian Defence Institute "Prof. Tsvetan Lazarov". He graduated from the Naval Academy in Varna, Bulgaria in 1982. After serving as a commissioned officer at Naval Base Varna, the Navy Headquarters and the Ministry of defence, he applied for a doctoral study degree in 1988 at the Institute of Sociology, Bulgarian Academy of Sciences in Sofia, Bulgaria and received his PhD in 1995. Besides, he acquired the degree of Doctor of Science in sociology from the same institute in 2009. He specialized as an International Research Fellow at the NATO Defense College in Rome, Italy in 1999 and Cologne University, Germany in 2001 and 2007. He was a Fulbright Visiting Research Professor at the Defense Equal Opportunity Management Institute (DEOMI), Patrick Air Force Base, FL from October 2012 to March 2013. While at DEOMI his research was related to diversity management and cross-cultural competence in defence organizations. Professor Yanakiev was part of the training them which organised, in cooperation with the ESDC, orientation course on CSDP in Varna in 2015. He has been a principal national representative to the NATO Science and Technology Organization, Human Factors and Medicine Panel since 2005 and chaired Task Group "Improving Organizational Effectiveness of Coalition Operations." Also, he served as principal investigator for the Bulgarian – U.S. NATO supported Project "Factors that Influence Coalition Teamwork" in 2009-2011. He currently chairs Task Group on "Human Systems Integration Approach to Cyber Security". Professor Yanakiev received Individual Scientific Achievement Award of NATO Science and Technology Organization for 2018. He has published more than 200 monographs, articles and research papers in the field of the sociology of the military, human factors in defence organisations, different aspects of civil-military relations, interethnic relations in Bulgaria, in Bulgarian, English and Russian languages.

**Associate professor Dr Maya Bozhilova (female)** received an M.S. degree in Mathematics & Informatics from the Sofia University, Bulgaria in 1992 and a PhD degree in Computer science from the Defence Advanced Research Institute, Sofia, Bulgaria in 2010. In September 1992, she joined the Military Scientific & Research Institute of the Bulgarian Ministry of Defence. She is currently an Associate professor at the Bulgarian Defence Institute. Dr Bozhilova is a senior researcher at the Development of C4I Systems Directorate. She participated in the development of information systems for different military applications. She is also a member of the Bulgarian IT team of FP7 project "HOMER". Her professional experience could be helpful during the development of the underlying collaborative information systems in the project. Her research interests are in the fields of software system reliability, information security and computer networks. She is author of one book and published more than 50 papers, publications, and reports.

**Lieutenant colonel, Assoc. Prof. Dr Hristo Hristov (male)** is doctor in the field of higher education "Technical Sciences", professional field Dynamics, and ballistics and flight control. He graduated from National Military University "Vasil Levski" - V. Tarnovo in 2001. Also, in 2014 he got Doctor's degree in Automated systems for information processing and management on the topic: Research and modelling of the spread of toxic chemicals in sparsely populated areas. His expertise is in the areas of Chemical, Biological, Radiological, Nuclear protection and ecology, chemical technologies related to security and defence, critical infrastructure protection and ecotoxicology. From March to April 2017 Hristo Hristov specialized in the University of Edinburgh, UK (Topic: Study on application of light-weight materials for ballistic protection). Hristo Hristov participated in the following NATO and EU funded projects: 1) NATO Science and Technology Organization, 2012-2015, "Study for Estimation, Reduction and Pollution Prevention of Army Test Ranges"; 2) HOMER, Grant agreement no: 312883 Homemade explosives (HMEs) and recipes characterisation- Capability"; 3) H2020-SEC-2016-2017-1, 2018-2021 ROBORDER autonomous swarm of heterogeneous ROBots for BORDER surveillance.

**Lieutenant colonel Assoc. Prof. Dr Iliyan Hutov, (male)** received his M.Sc. degree in Transport Engineering together with a military speciality in Engineering troops-sapper from the National Military University in 2002. He is an engineer and expert in blast engineering and EOD and holds a PhD in Impact of explosives of available materials on building structures. Has vast field experience on the explosives and EOD activities with several deployments in Iraq and Afghanistan as commanding officer, instructor, and advisor. Now he is an associate professor in Bulgarian Defence Institute. His research activities are directed on physics and chemistry of energetic materials, homemade explosives, IED's and EOD activities, modelling and simulation of blast load and blast effects on structures and materials. He has participated in several national and multinational research projects related to these topics. Also, he has published journal papers and reports.

#### **Relevant Publications, products, services**

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#### Relevant Projects / Activities / Initiatives

BDI has broad experience in many H2020, European Defence Agency and NATO funded projects. Some of the projects that we consider relevant are:

- MEDEA “Mediterranean practitioners’ network & capacity building for an effective response to emerging security challenges” Project H2020, 2018-2023 (Thematic Community of Practitioners on “Natural hazards and technological accidents”);
- ECHO: European network of Cybersecurity centres and competence Hub for innovation and Operations, H2020 -2019-2023.
- SOLOMON “Strategy Oriented anaLysis Of the Market fOrces in EU defence”, EDA Project, Preparatory Action on Defence Research programme, PADR-STF-2018 (Strategic Technology Foresight) call, and PADR-STF-02-2018 topic, 2018-2021.
- PYTHIA „Predictive methodology for Technology Intelligence Analysis “, EDA Project 2017-2020;
- ROBORDER “autonomous swarm of heterogeneous ROBots for surveillance” H2020-SEC-2016-2017-2018-2021.
- Gaming for Peace (GaP): H2020 project (2015-2018): study and analyse soft skills required for mission abroad (peacekeeping). Develop a role-based computer game for training the soft skills of the personnel.

#### Infrastructure and Technical Equipment

BDI manages CIS and Cyber laboratory – advanced computer laboratory for testing and experimentation based on a virtualized platform with a capacity of 896 GB RAM, 168 cores and 54 TB storage. Besides, the Institute hosts DJI SPREADING WINGS S1000+ and MATRICE 100 drone systems – development and testing. BDI, as an academic institution, will utilize the activities and results of VALKYRIES project to support and extend its research potential with PhD thesis work in the areas of the project with a focus on Human Systems Integration. Finally, BDI is responsible for Central Artillery Testing Range – Military Facility for testing and experimentation of armaments, equipment, and technologies that needs field testing.

#### Individual Exploitation Plan


<b>Exploitation Goals</b>	BDI exploitation interests are in the opportunity to help and support the Bulgarian authorities, and particularly, the Bulgarian MoD on defence and security policy formulation and implementation
<b>Topics/Domain</b>	Multidisciplinary scientific activities which cover both ICT and human, social and societal factors, CBRNE and standardization domains
<b>Approach and Activities</b>	BDI will exploit its links to many EDA and NATO STO activities and international projects to disseminate VALKYRIES results and will organise several special sessions/tracks focused on VALKYRIES project data and findings under the Military Technology and Systems (MT&S) conference, organised and hosted by BDI, and the defence, antiterrorism and security exhibition HEMUS organised under the auspices of the Bulgarian Ministry of Defence.

#### Individual Dissemination Plan

<b>Dissemination Goals and Target Groups</b>	To make the results from VALKYRIES project available policymakers, first responders and researchers in the EU MS and partner states.
<b>Planned Activities</b>	Professors and researchers in BDI are committed to develop and publish in peer-reviewed journals in the fields of Defence and Security Policy, Human Factors in defence and security, Cloud, IoT, Artificial Intelligence, and in general in ICT.

	Besides, BDI will use the Defence Science and Technology Journal (JDST) which is edited and published by the Institute to disseminate projects' results.
<b>Indicative List of Events</b>	Yearly MT&S conference of BDI, by-annual HEMUS conference, publications in scientific journals, NATO STO and EDA conferences and workshops, International Scientific yearly international Conference Digital Transformation, Cyber Security and Resilience

#### 4.1.11. BULGARIAN RED CROSS

<b>Partner Full Name</b>	<b>Bulgarian Red Cross</b>		
<b>Short Name</b>	BRC	<b>Country</b>	Bulgaria
<b>Type</b>	Non for profit / NGO	<b>Website</b>	www.redcross.bg
<b>Official Logo</b>			
			
<b>Brief Partner Profile</b>			
<p>The <b>Bulgarian Red Cross</b> is an autonomous organization which assists the state in the humanitarian sphere, in the preparation for actions in wartime, military conflicts, and disasters, for preserving and strengthening the health of the population, and educating it in a spirit of high morality, compassion, and charity. The BRC works according to its statutes and the principles of the International Red Cross Movement, as well as according to the first Bulgarian Red Cross Law adopted in 1995 by the 37th Bulgarian Parliament. The organization is registered as a non-profit entity.</p> <p>The BRC works to increase the population's disaster preparedness, and together with Civil Protection bodies, prepares first aid formations and renders first aid. BRC is included in the National Disaster Plan and assists the state in rendering humanitarian aid and in activities protecting and strengthening the population's health in case of disasters and crises. The BRC disaster structure consists of a National Disaster Response Team, a volunteer rescue team of professionals created to support BRC disaster relief activities and humanitarian activities protecting and strengthening the population's health in case of disasters, accidents, and crises; and Volunteer Disaster Response Teams in each region of the country, formed to support organizational structures in case of disasters. Additional resources include organized and spontaneous volunteers; volunteers from other regional BRC organizations; mountain rescue teams; national and regional water lifesaving teams, trained to act in case of floods and high water; youth volunteer disaster teams; members of refugee and mi-grant services; and professional teams for provision of psychological first aid.</p> <p>The BRC's organizational units, which will take part and will contribute to the project include: International Cooperation and Programs department, Disaster Management department, Mountain Rescue Service, Water Life Saving Service, Bulgarian Red Cross Youth, National Training and Logistics Centre, as well as BRC territorial unit/s according to the project tasks to be implemented.</p>			
<b>Role in Project</b>			
<p>The main role of BRC in the VALKYRIES project will be as end user. The BRC will be providing access to its disaster response volunteers and units, it will participate in field trials in Bulgaria, and will be a contributor to other work packages as required, to adjust the project deliverables to the needs of end users. BRC will bring, comparable to the other operational project partners, their view and guidance into the project, within all work packages.</p>			
<b>Key Personnel's CVs</b>			
<p><b>Prof. Dr. Krasimir Gigov, MD, (male)</b> is a General Director of BRC. Expert in the areas of Organization of Medicine in Catastrophes and Military Toxicology. Additional qualifications in Military Toxicology, Automation of medical service management, Sankt Petersburg; Healthcare in the context of market economy, Sofia; International Humanitarian Law in armed conflicts, Geneva; Organization of medical support in emergency situations, San Marino; Emergency response in Nuclear Accidents, Greece; Healthcare management; Training course for international inspectors on the Convention on the Prohibition of Chemical Weapons, Paris; Prevention of Technological Risks, Paris; Accreditation of medical facilities, Sofia. Scientific publications - approx. 160 publications, out of which 4 study books as a co-author. Professor, Chief Professor /Chief Assistant/, Head of Department, Head of Sector, Head of Department "Medicine of catastrophes", Deputy Director of the Military Medical Academy, Director of "Military healthcare" Directorate; Chief Secretary at the Ministry of Health and Senior National Representative of Bulgaria to the Joint Medical Committee of NATO (JMC); Director of the Bulgarian National Medical Coordination Centre. In different periods served as a Consultant to the Ministry of Health, Governmental Commission on Disaster and Accident Management, Ministry of Foreign Affairs, Ministry of Ecology and others, on issues related to organization of medical support in extreme situations, toxicology, radiology and others. Member of the Specialized Council at the Higher Attestation Commission until 2011, member of the National Council of the Bulgarian Red Cross until 2010, Chairman of the National Scientific Medical Association on "Medicine in Catastrophes". Active member of the New York Academy since 1996;</p>			



honorary member of the US National System of Disaster Medicine; member of the International and the European Society of Disaster Medicine.

**Mrs. Diana Balova (female)** is a Deputy Director of BRC National Training and Logistics Centre /NTLC/ in charge of educational and training activities. MsC in Public health and health management. The NTLC is accredited by Ministry of education body for provision of in all social related professional qualifications, incl. Paramedics.

**Mr. Nikolay Todorov (male)** is a Head of International operations, programmes, and project unit of BRC. Graduated in the field of Economy of transport and communications, Prague University of economy, Czech Republic, Foreign trade and International Law, University of National and International Economy, Sofia, Bulgaria, Management in national security and defence, Military academy “G.S.Rakovsky”, Sofia, Bulgaria. Over 20 years of project management experience inc. SPO of PHARE and Deputy head of Intermediate Body. External expert on Grants evaluation to the Council of Ministers of Republic of Bulgaria. Project Manager for Technical Assistance Project under OP "Environment" - "Reconstruction and modernization of existing solid waste landfill in the municipality of Gabrovo, turning it into the needs of the regional municipality of Gabrovo and Tryavna." Project manager of "Home Care for an independent and dignified life scheme BG051PO001-5.2.07 care in a family environment for the independence and dignity of people with different types of disabilities and lone living people -" Social Assistant and Housekeeper " phase-3 . Project manager of project № CSP 005 – 126/04.07.2013 “PREPARED TOGETHER FOR DISASTERS, ACCIDENTS AND CRISES (DAC)” funded by Bulgarian-Swiss Cooperation Programme, Reform Fund for Civil Society Participation. BRC project manager of ECHO/SUB/2014/696671 Enhancing the preparedness and response capacities of Belarus Red Cross Society (BRCS) and Ukraine Red Cross Society (URCS) (PrepCAP). Supervisor of project BG/AMIF – SO2 – NO2 – A2 “Provision of support such as administrative and legal support, medical, psychological and social assistance to Third Country Nationals, granted international protection”. BRC project manager of 783191 — ProVoice — UCPM-2017-PP-AG, “Promoting the role of volunteers and the population in Civil Protection (ProVoice)”. Project manager of “Help for integration” project number 812108-75/11.10.2017/ BG65AMNP001-2.004-0003-C01 funded by AMIF – national programme. Project manager /BRC/ of Resilient Europe and Societies by Innovating Local Communities /RESILOC/ - Grant Agreement number: 833671 — RESILOC — H2020-SU-SEC-2018-2019-2020/H2020-SU-SEC-2018.

#### Relevant Publications, products, services

- **783191 – ProVoice – UCPM-2017-PP-AG - Global recommendations and Key Messages with regard to Population Awareness, spontaneous volunteering and effective volunteer management (2020).** In the frames of the ProVoice project, this document was produced based on the contributions from Red Cross/civil society organizations (CSOs) and civil protection authorities (CPAs) in Belarus, Moldova and Ukraine, with input and best practices provided by Red Cross organizations in EU countries – Austria, Bulgaria, Denmark, Finland, Hungary, Italy and Latvia. The purpose was to equip the CSOs and CPAs in Belarus, Moldova, and Ukraine with the best practices for effective population awareness, volunteer management and involvement of spontaneous volunteers to cope with emergency situations. The Bulgarian Red Cross was responsible for the work package related to this international exchange and production of the document.
- **MERCI - ECHO/SUB/2016/740138/PREP28: Survey report – Needs and abilities of parties involved in crisis management. Multi-site and multi-risk events (2017).** This document collected the available evidence to reveal the current state of the knowledge, practices and requirements of the players who respond to emergency situations, both volunteers and professionals. More specifically, this survey aimed to identify how crisis management players in European countries handle “multi-site” or “multi-risk” events. Authors / Main researchers: Cassandre Rey-Thibault (LATTS), Amélie Branchereau (French Red Cross), Valérie November (LATTS), Lucie Leblond (European Red Cross Office). Contribution: French Red Cross, Laboratoire Techniques, Territoires et Sociétés (LATTS), Ecole des Ponts ParisTech, European Red Cross Office, Bulgarian Red Cross, Spanish Red Cross, Italian Red Cross, Portuguese Red Cross.
- **MERCI - ECHO/SUB/2016/740138/PREP28: Common training course programme for commanders and responders (2019).** Based on the survey report, a state of art study and further development of tools to support responders and commanders for response to multi-site multi-risk events (guidelines for volunteer civil protection organisations in EU, shared operational protocols, etc.), the Bulgarian Red Cross led the work package dedicated to creation of a training curriculum and implementation of 3-level trainings in all partner countries. The BRC organized and developed the overall curriculum, while each of the project partners (Bulgarian Red Cross, French Red Cross, Italian Red Cross, Portuguese Red Cross, Spanish Red Cross), as well as Austrian Red Cross, IFRC and Red Cross EU office who also contributed to the content.

#### Relevant Projects / Activities / Initiatives

- **SAAM - Supporting Active Ageing through Multimodal coaching (2017: H2020 RIA).** SAAM is a complex and ambitious multi-disciplinary project, advancing the state of the art in the fields of machine learning, user profiling and interfaces, affective computing, multi-modal coaching, sensors and data synthesis, and many others, with the purpose to support the aging population living at home, with a novel and practical emphasis on ambient sensing and learning of user needs and preferences, and effective coaching by leveraging the user's social support networks.  
In SAAM, the BRC's role was to identify elderly volunteer needs in terms of active ageing, in carrying out regional pilots of the SAAM system, and in general outreach activities.
- **RESILOC - Resilient Europe and Societies by Innovating Local Communities (2019: H2020 RIA).** RESILOC aims at studying and implementing a holistic framework of studies, methods and software instruments that combines the physical with the less tangible aspects associated with human behaviour. Assessment of the resilience indicators of a community are performed together with simulations on the "what-if" certain measures are taken. These methods will serve for designing and implementing two software instruments:
  - RESILOC inventory, a comprehensive, live, structure for collecting, classifying, and using information on cities and local communities, implemented as a Software as a Service (SaaS).
  - RESILOC Cloud-based platform for assessing and calculating the resilience indicators of a city or a community, for developing localised strategies and verifying their impacts on the resilience of the community. The Cloud platform, a combination of SaaS and PaaS, includes the inventory as its repository.
 In RESILOC, the BRC's role was to contribute to the development of resilience indicators, defining the needs of responders and local communities and conducting a field trial of the developed tools in Bulgaria to feed back the further development of the software instruments.

#### Infrastructure and Technical Equipment

The main infrastructure to be used in the project will be the BRC's National Training and Logistics Centre, situated in a pine forest at the foot of the Lozen Mountain near Sofia. The campus will be used as a base for training and professional education, including organized trainings and simulations. The campus provides a place for conferences and seminars, with amenities including 100 beds, a conference centre with six halls with modern audio-visual equipment, an entertainment centre, fields and facilities for mini-football, basketball, and archery, and cross-terrain fields equipped for paintball and strike-ball.

#### Individual Exploitation Plan

<b>Exploitation Goals</b>	The BRC will be aiming at using the best outcomes of the VALKIRIES project to improve and modernise its training and educational programs on comm topics, for its 28 regional disaster response teams, and the teams engaged in the BRC mountain rescue and water lifesaving services.
<b>Topics/Domain</b>	SOP, COMM
<b>Approach and Activities</b>	The BRC pays particular interest in the opportunities that will be created by the project communication interoperability with teams in different international locations, which may prove valuable in the context of the wider Red Cross Red Crescent Movement. The reason for this is that the Movement's international disaster response around the world is based on "surge capacity" – a pool of professionals from all countries in the world, uniformly trained and prepared in accordance with internationally recognised disaster response competences. They are deployed to the disaster affected areas around the globe with the mission to respond to the emergency, and often they operate in a very complex and insecure environment. The achievement of the project deliverables may greatly contribute for building interoperability, not only in Europe, but also on other continents.

<b>Individual Dissemination Plan</b>	
<b>Dissemination Goals and Target Groups</b>	To spread information about results and good practices achieved by the Valkyries among professionals in the Red Cross and Red Crescent International Movement and International platforms and organizations BRC is part of.
<b>Planned Activities</b>	<p>The BRC will disseminate the results of Valkyries in its website and social media, as well as through its bi-weekly electronic bulletin, distributed to various media and stakeholders in Bulgaria. Specifically, the project results will be communicated with the National Civil Protection authority in Bulgaria (DG “Fire Safety and Protection of Population”) and with the NATO Centre of Excellence in Bulgaria.</p> <p>Internationally, the BRC will disseminate the project results within the Red Cross Red Crescent Movement, specifically among EU National Societies through the Red Cross Office in Brussels (at EU level events) and in the wider Europe region through the Regional Office of the International Federation of the Red Cross Red Crescent Societies in Budapest. Depending on the nature of project outcomes and their potential end users, the project results may be disseminated in other international platforms and networks in which the BRC is a member or has cooperation with. These possibilities include International Commission for Alpine Rescue (ICAR), International Life Saving Federation of Europe (ILSE), Disaster Preparedness and Prevention Initiative for South-Eastern Europe (DPPI SEE), etc.</p>

#### 4.1.12. KENTRO MELETON ASFALEIAS

<b>Partner Full Name</b>	<b>Centre for Security Studies / KENTRO MELETON ASFALEIAS</b>		
<b>Short Name</b>	<b>KEMEA</b>	<b>Country</b>	Greece
<b>Type</b>	Non-Profit / Research Organisation	<b>Website</b>	<a href="http://www.kemea.gr">http://www.kemea.gr</a>

#### Official Logo



#### Brief Partner Profile

The **Centre for Security Studies (KEMEA)** is a think tank on homeland security policies and an established research centre since 2005 (L. 3387/2005) within the Hellenic Ministry of Citizen Protection (former Ministry of Public Order and Citizen Protection), aiming to support security policy implementations as well as civil protection consultation in Greece, at a strategic level. KEMEA is appointed as the **Greek “National Contact Point” for the implementation of Directive 2008/114/EC**, regarding the protection of European Critical Infrastructures.

KEMEA is actively involved in: (a) **Research and development** in the context of implementation of National and European projects under the topics of physical and cyber security and civil protection, in close cooperation with LEAs, working under the auspices of the Ministry of Citizen Protection, civil protection national, regional and local authorities; (b) **Training of practitioners** in new systems and technologies; (c) **Certification of practitioners** in private security professions at national level; (d) **Organization of table-top and field exercises** to test and evaluate preparedness and response of public services, organizations and authorities to emergencies and crises. KEMEA also provides advisory and consulting services to the Ministry of Citizen Protection, as well as other Public and Private authorities, on safety and security issues.

The main role of KEMEA is to **bring together all national Law Enforcement Agencies** (Police, Fire Service, Coast Guard, etc.), Civil Protection agencies and other relevant stakeholders in the disaster management cycle and society’s security and resilience, so as to enable them to collaborate, exchange experiences and build synergies among them and with other European research/academic institutions and industry for (i) adopting common and complimentary preparedness measures; (ii) standardizing communication flow; (iii) establishing common response capabilities; (iv) collaborating with the industry, research institutions and academia for developing new operational capabilities; (v) anticipating and adopting targeted actions towards disaster risk reduction and resilience enhancement. Meanwhile, the close collaboration of KEMEA with all the above-mentioned parties, together with the expertise of its associates, allows for the evaluation of existing methodologies and guidelines in the field of security and civil protection, adaptation to specific needs of the Greek reality, as well as validation studies of innovative systems and recommendations to related stakeholders.

This dedicated effort to explore new synergies, establish communication links and efficiently collaborate to produce end-user driven research that addresses the different perspectives of the Security Sector during the last decade, has granted KEMEA its participation in numerous National and EC funded R&D projects.

In addition, **KEMEA is member of several European associations and organizations** and it represented the Greek Government as a member of the “European Security Research and Innovation Forum (ESRIF)”. Amongst other associations and organizations, KEMEA is a member of the “Public Safety Communication Europe Forum (PSCF)”, the “European Association of Research and Technology Organizations” and has established links to the ENLETS community (European Network of Law Enforcement Technology Services). KEMEA is also a founding member of the European Organisation for Security (EOS), it cooperates closely with the RAN Centre of Excellence and a Framework Partner of CEPOL. Additionally, KEMEA is an active full member of the European Association for Biometrics (EAB), a member of the EENA (European Emergency Number Association), a member of the European Association of Research and Technology and a member of the European Cyber Security Organisation (ECSO) ASBL and a member of the European Association of Research and Technology organizations (EARTO).

KEMEA currently employs more than 130 highly qualified and experienced researchers and Security experts, including also active LEA officers. These researchers and experts are specialized in various topics such as: Border Management and Surveillance, Smart Borders, Crisis Management, Emergency Response, GIS, Hazardous

Materials, Information Security, Cyber Security, Information Systems, Telecommunications, Ad Hoc Networks, Civil Protection, Operational Readiness Exercises, Statistics, International Relations, Transportation Security and European Policy, Procurements, Law and Ethics, Dissemination, Communication & Exploitation *etc.* Furthermore, regarding its capacity and under its constitutional law, KEMEA, if needed, can additionally utilize personnel and assets of the Hellenic Ministry of Citizen Protection, in order to fulfil specific tasks of various projects; this equates to a staff pool of over 70,000 people being readily available.

**KEMEA operates a large, open test facility located in Markopoulo**, 30 km South-East of Athens, that can host a vast range of events within the scope of Research, indoor and outdoor testing, Pre-Operational-Validation (POV) and Pre-Commercial-Procurement (PCP). This test facility is also used for focused short courses, mixed indoor and outdoor training for security practices, field-testing and specialized educational programs. Another asset operated by KEMEA is the **Operational Centre Simulation Infrastructure (OCSI)** which is a test environment and fully operating legacy system that operates at a pilot scale, demonstrating and validating crisis & emergency management solutions and supporting readiness exercises.

### Role in Project

KEMEA will have a significant contribution to WP7 (Reference Integration, Evaluation and Demonstration), leading Task 7.1, which constitutes the baseline for the implementation and demonstration of the use cases and participating in all related WP Tasks and being actively involved in use cases 2 and 4. In addition, KEMEA is engaged in 14 Tasks of the other WPs, as a key partner for bringing in contact Greek LEA and First Responders with relevant practitioners from other countries to exchange experience and share knowledge and current practices to support the implementation of common operational processes, specifications and standards.

### Relative Expertise / Experience

Field of expertise	Description of the expertise or experience related to this expertise	Added value for the project
<b>Identification and prioritization of practitioners' capability gaps</b>	KEMEA is mainly involved in identifying and prioritizing practitioner's capability gaps (their requirements) and co-define operational Requirements, in which end-user and organisational requirements for the developed system are specified. KEMEA provides a "smooth translation" of the Operational – Functional End User Needs in several EU funded security projects.	The identification of practitioner' needs is an essential part for the pre-standardization processes and definition of semantics foreseen in the design of principles and harmonization tactics of VALKYRIES.
<b>Scenario building,</b>	Furthermore, tasks like scenario building, adaptation and elicitation have been carried out for the validation of the developed solution in many EU funded projects. System evaluations are performed in real conditions at partners test-bed facilities with active participation of public and private safety and security stakeholders. KEMEA has undertaken similar tasks in variety of projects, including <i>inter alia</i> 5G-TOURS, AIDERS, BROADMAP, BROADWAY, HIT-GATE, MEDEA, PREDICATE and ESS.	The relevant experience of KEMEA in scenario building and preparation of table-top exercises and pilot demonstration will be exploited for the design of the testbeds, the implementation and evaluation of the use cases.
<b>Dissemination &amp; Communication</b>	Finally, KEMEA is actively involved in Dissemination & Communication actions by designing an integrated approach including D&C strategy, digital channels & tools, promo material and activities targeting relevant	The strong links of KEMEA with First Responders, Civil Protection authorities and policy makers will significantly contribute to the promotion of VALKYRIES outcomes, dissemination and communication to targeted



	<p>audiences. Project findings and research outputs are disseminated through workshops organized by KEMEA, as well as via a strong presence in International Scientific and Thematic conferences. KEMEA also undertakes the organisation of final demonstration events for end-users and stakeholders in numerous relevant projects and facilitates communication with Critical Infrastructure stakeholders, so that the dissemination of research findings in practitioners' public private operations becomes a straightforward process.</p>	<p>key stakeholders and their potential adoption. KEMEA will also undertake a significant role for the success of workshops foreseen during the VALKYRIES implementation phase.</p>
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#### Key Personnel's CVs

**Chrysoula Papathanasiou (PhD) (female)** is a Civil Engineer, holding a PhD degree in Hydrology from the National Technical University of Athens (NTUA), an MSc in Water Resources Science and Technology from NTUA and a BEng degree in Civil Engineering from the University of Patras. She specialises in Hydrology, Flood Modelling, Weather Radar Hydrology, Hydraulics, Water Resources Management and Geotechnical Mechanics. She is an expert in flood modelling and has extensive knowledge of hydrological processes. Her PhD dissertation focused on the examination of post-fire hydrological behaviour of periurban catchments and concluded with the development of a methodological framework to theoretically estimate the dynamic evolution of hydrological parameters that affect flood risk as a function of time, following the occurrence of forest fires. She has also extensive experience in using GIS Tools in Hydrology and Water Resources Management, as well as in comparatively analysing rainfall events using rain gauges and weather radar data. Currently, she is a Research Associate at the Centre for Security Studies (KEMEA), of the Hellenic Ministry of Citizen Protection and she is actively involved in the design and implementation of several European and National research programs. Since 2006 she is involved in the design, implementation and management of research programs as well as in the implementation of hydraulic, hydrologic and water resources management studies.

**Vassiliki Varela (BSc) (female)** holds a University degree in Forestry and Environmental Protection from the Aristotelian University of Thessaloniki (Gr) since 1987. She has worked for more than 20 years in the private ICT sector in public and private contracts dealing with environmental management and spatial data specifications and quality control. Furthermore, she has participated in several European and National R&D projects related to Forest Fires management as technical team leader or Principal Investigator. She is a GIS expert with many years of experience in GIS-based programming and in analysis and development of Natural Hazards management information systems. She also has significant experience in the development and exploitation of spatial datasets for environmental purposes and a very good knowledge of Spatial Data Standards and National and European Spatial Databases. Her main scientific interests are found in spatial analyses for Environmental protection, processing and mapping of physical parameters and study and adaptation of world-wide used Environmental indices and models, in the Mediterranean areas and particularly in Greece. Currently, she is an associate researcher at the Centre for Security Studies (KEMEA)

**Danai Kazantzidou-Firtinidou (MSc) (female)** is a Civil Engineer (NTUA, Greece) with MSc in Earthquake Engineering (IUSS Pavia, Univ. of Patras). The past 4 years she works as Research Associate at the Centre for Security Studies (Ministry of Citizen Protection) in Greece, where she is involved in projects related with civil protection and critical infrastructures protection, holding the position of Officer at the Coordination Centre for Critical Infrastructures Protection. Her expertise is in seismic risk assessment, having 10 years of experience with participation in several European and national funded programs in Greece and other European countries, focusing on the scientific support of civil protection and risk management. More specifically, she has participated in disaster management planning and evacuation exercises, trials for the development of technological tools supporting crisis management, technical post-earthquake visits, studies of seismic vulnerability and risk and is contributing as national expert in risk assessment projects. She has more than 15 scientific publications in peer reviewed

journals and international conferences. She is member of the Technical Chamber of Greece (TEE), the Swiss Society for Earthquake Engineering and structural Dynamics (Sgeb), the Earthquake Engineering Field Investigation Team (EEFIT) of the Institution of Structural Engineers in UK and of the we4DRR (Women exchange Network for Disaster Risk Reduction).

**Anastasios I. Valvis (PhD) (male)** is a political scientist. He has been adjunct lecturer at the Department of Political Science and International Relations, University of the Peloponnese teaching ‘Global Governance and Civil Society’, ‘Environment and Politics’, and ‘Politics, Economy and the Society in the “Third World”’ (2016-2020). He awarded his PhD from the same department (2016). His thesis focused on environmental security and transboundary water management in the Balkans. Prior to that, Dr. Valvis obtained his BA (2005) from the department of Political Science and Public Administration, University of Athens and his MA (2006) on International Terrorism and Security Studies from the University of Bradford, department of Peace Studies. In the past, he has taught European Law and Public Relations at the Hellenic Police Academy in Komotini (2012). His professional experience includes management of social projects funded by international donors on behalf of the Municipality of Athens (EEA Grants, UNHCR-ECHO, Stavros Niarchos Foundation). Over the last years, Dr. Valvis has, also, participated in various research projects with a focus on the Greek NGO ecosystem, the refugee crisis (Thales: Evaluation of Greek NGOs, The impact of the Refugee Crisis on the NGO ecosystem in Greece) and on Greek Foreign Policy in the Balkans (Southeast Europe Programme, ELIAMEP). Since March 2018, Dr. Valvis is running the 2nd round of the Thales Project (Mapping and Evaluation of the Greek NGOs), funded by five charitable foundations: TIMA, Stavros Niarchos, Athanassios K. Laskaridis, Captain Vassilis & Carmen Constantakopoulos, John S Latsis. He is currently research associate at the Centre for Security Studies of the Hellenic Ministry of Citizen Protection where he is involved in EU and Nationally Funded R&D projects related to radicalization (DG Justice & DG HOME). Dr. Valvis has participated in more than ten international academic conferences, while part of his work has been published in peer reviewed journals and edited volumes. He occasionally writes articles in the Greek press.

#### Relevant Publications, products, services

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#### Relevant Projects / Activities / Initiatives

- **STRATEGY** - Facilitating EU pre-Standardization process Through streamlining and validating interoperability in systems and procedures involved in the crisis management cycle (SU-DRS03-2018-2019-2020: Pre-normative research and demonstration for disaster-resilient societies) (H2020) (GA. 883520) - STRATEGY will develop a pan-European framework of the pre-standardisation activities for systems, solutions and procedures, addressing crisis management, validated by sustainable tests and evaluation frameworks which will improve the crisis management and disaster resilience capabilities, including EDA initiatives in the CBRN-



E area. Based on the needs identified from previous EU initiatives and the desktop research on the EU priorities, the project addresses six streams within the Crisis management phasma, such as Critical infrastructures protection, Response planning, Search and Rescue, Command and Control, Early Warning Systems and Rapid Damage Assessment and cross correlates them with six distinctive building blocks of the interoperability areas such as Common Procedures, Training, Terminology, Data sharing and Equipment as well as the CBRN-E emergencies. Aiming at selecting and implementing existing, evolving and new standards within solutions, tools and procedural guidelines and recommendations STRATEGY will streamline and validate technical and organisational interoperability in a fully transboundary configuration with means of standards through the implementation of uses cases involving EU and National Standardisation bodies. STRATEGY aims at a consistent presence of all actively involved experts from security stakeholders throughout all stages of standardisation, from the preparatory work done in Programming Mandates until the concrete standardisation work in Technical Committees (TCs) and Common Working Groups (CWGs) to assure the success of the standardisation actions of the EC. The ultimate project goal is to strengthen the resilience of EU against all types of natural & manmade disasters (multi-hazard approach), by ensuring FR safety and empowering their operational capacity though validating the standards of next generation solutions and procedures ensuring an effective and efficient collaborative response.

- **SPARTA** - Strategic programs for advanced research and technology in Europe (SU-ICT-03-2018 - Establishing and operating a pilot for a Cybersecurity Competence Network to develop and implement a common Cybersecurity Research & Innovation Roadmap) (H2020) (GA. 830892) - In the domain of Cybersecurity Research and innovation, European scientists hold pioneering positions in fields such as cryptography, formal methods, or secure components. Yet this excellence on focused domains does not translate into larger-scale, system-level advantages. Too often, scattered and small teams fall short of critical mass capabilities, despite demonstrating world-class talent and results. Europe's strength is in its diversity, but that strength is only materialised if we cooperate, combine, and develop common lines of research. Given today's societal challenges, this has become more than an advantage – an urgent necessity. Various approaches are being developed to enhance collaboration at many levels. Europe's framework programs have sprung projects in cybersecurity over the past thirty years, encouraging international cooperation and funding support actions. More recently, the Cybersecurity PPP has brought together public institutions and industrial actors around common roadmaps and projects. While encouraging, these efforts have highlighted the need to break the mould, to step up investments and intensify coordination. The SPARTA proposal brings together a unique set of actors at the intersection of scientific excellence, technological innovation, and societal sciences in cybersecurity. Strongly guided by concrete and risky challenges, it will setup unique collaboration means, leading the way in building transformative capabilities and forming world-leading expertise centres. Through innovative governance, ambitious demonstration cases, and active community engagement, SPARTA aims at re-thinking the way cybersecurity research is performed in Europe across domains and expertise, from foundations to applications, in academia and industry.
- **FIRE-IN** - Fire and Rescue Innovation Network (SEC-21-GM-2016-2017 - Pan European Networks of practitioners and other actors in the field of security) (H2020) (GA. 740575) - FIRE-IN has been designed to raise the security level of EU citizens by improving the national and European Fire & Rescue (F&R) capability development process. FIRE-IN is involved with four main areas of activity: (i) the identification and harmonisation of operational capability gaps based on the contribution provided by a significant and heterogeneous practitioner network, (ii) the identification of promising solutions to address those gaps through monitoring and screening of research outcomes and the continuous involvement of research and industry representatives, (iii) the definition of a F&R Strategic Research and Standardisation Agenda (SRSA) based on the previous elements as well as (iv) the development of a concept for more efficient use of test & demonstration and training facilities to support innovation and joint skill development. The overarching result of the project will be a proven process for organising F&R capability-driven research based on a wide practitioner and research and innovation network. The network will be linked at cross-domain and cross-border level and will feed harmonised operational requirements (or challenges) into national and EU capability development, i.e. research, innovation, procurement and standardisation programmes.
- **MEDEA** - Mediterranean practitioners network & capacity building for effective response to emerging security challenges (SEC-21-GM-2016-2017 Pan European Network of practitioners and other actors in the field of security) (H2020) (GA. 787111) - The MEDEA project will form a Mediterranean and Black Sea (M&BS) security practitioners' network for effective response to emerging challenges. During its 60 months duration the following four interrelated actions are planned. [1] Establish and Operate a multi-disciplinary network of security practitioners, with active links to policy makers and users/providers of security innovations across the

M&BS countries focusing on Border Protection and other Security - and Disaster - Related tasks. [2] Engage participants in anticipatory governance on emerging security challenges that the M&BS regions would face in the coming years (present until +10 years), which concretely operationalizes the backbone of the project in a triple structure: a) understanding unsatisfactory state of play, b) design the desirable future and c) define a resilient pathway on how to achieve this, [3] Push for the “co-creation” of security technology and capabilities innovations between practitioners and innovation suppliers, which is based upon their evaluation and prioritization on multi-criteria analysis (technology, operational and cost benefit, etc.) and also linked to Human Development, Policy Making and Organizational Improvements in-terms of facilitating its use by the practitioners [4] Establish and annually update the Mediterranean Security Research and Innovation Agenda (MSRIA), that identifies areas where security & defence research is needed and the establishment of recommendations for European Security & Defence technology investments.

## Infrastructure and Technical Equipment

### Markopoulo Testbed Facility

The “Markopoulo Training Facility” is located just outside the city of Markopoulos, close to the “Eleftherios Venizelos” International Airport. During the 2004 Olympics this facility was used as the “Olympic Shooting Centre” and now is used for training purposes by the Hellenic Police. The facility can be used as a “Multi-purpose Training and Technology Test Bed Facility” for LEAS and Emergency Responders since it provides a controlled and safe environment for both testing and validation. There are two major constructions - a block of buildings and the tiers of the Olympic site that can be used for simulating an athletic mass gathering drill. The location has preinstalled CCTV cameras, a telephone network and Ethernet cables (Internet). The distance from the airport is approximately 3,5 miles – this info is related to UAV flights.



Figure 1. Aerial view of the “Markopoulo test site”

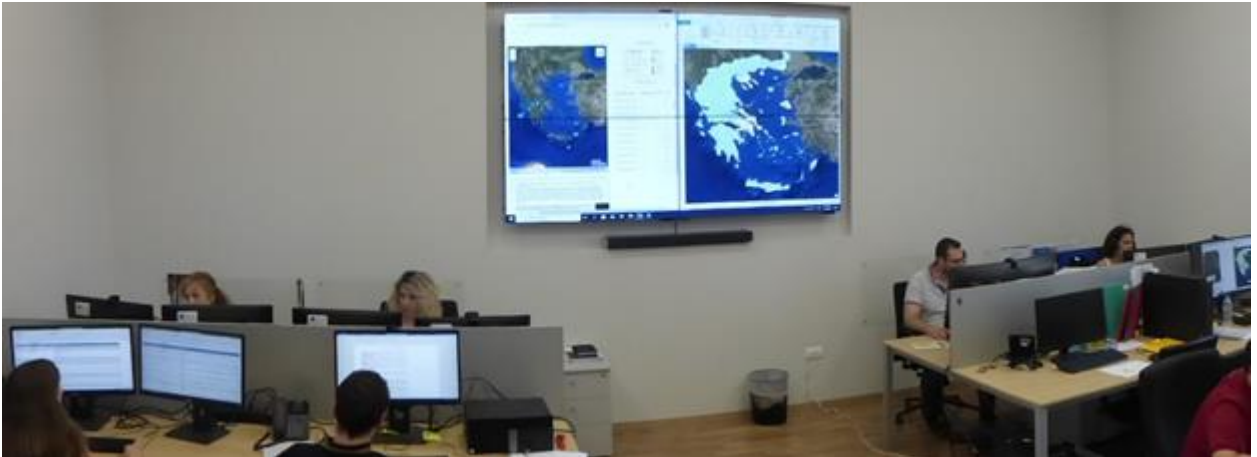
### KEMEA Operational Centre Simulation Infrastructure

The Operational Centre Simulation Infrastructure (OCSI) of KEMEA is a test environment and a fully operating legacy system simulator, which supports system development, integration, validation and testing from the mock-up scale, up to demo, pilot and preoperational level. OCSI of KEMEA is based on ArcGIS Enterprise platform combined with MS SQLServer RDBMS, which is hosted in dedicated servers in KEMEA premises.

OCSI covers practically any type of GIS functionality and spatiotemporal data management, supporting a wide range of powerful data science tools, workflow automation and data visualization as well.

The OCSI platform supports standards from several Geospatial Standards Organizations including OGC, ISO/TC211, IHO as well as a variety of other open IT standards related to metadata, communication protocols, data sharing, open architecture implementation and can be integrated with other platforms, services, devices and systems. Up to now, the implemented applications and services of the OCSI include web-services, web-apps and desktop software tools for natural hazard simulation and modelling, meteorological data processing, knowledge

bases and geodatabases relative to Critical Infrastructure Protection, Fire and Flood management DSS, Border Control Management Applications. OCSI of KEMEA serves interested parties as a fully functional facility to test, validate and demonstrate relevant new applications, services and integrated solutions.



### KEMEA Unmanned Aircraft System (UAS) Equipment

KEMEA owns the following UAS equipment, that is involved in several projects and studies, for analysis and assessment of a ROI, plus validation, evaluation and demonstration purposes of a research solution:

- 1x Matrice 210RTK with X5s, Z30 and XT2 payloads,
- 2x Mavic Platinum,
- 3x Mavic enterprise dual,
- 1x Spark
- 1x WintraOne with SONY RX1R II + PPK payloads
  - 1x SAFE-T with AirModule for Matrice 210

### KEMEA IT Infrastructure

KEMEA's IT Infrastructure is comprised of:

- **Physical Infrastructure:** A modern Datacentre, with specialised infrastructure cooling, access control and 40 KVA UPS, that hosts all the physical servers, storage and backup systems. All systems, and power lines are redundant, providing failover capabilities. Power is delivered to the Datacentre, via twin separate electricity lines from the central power plant. The space is also monitored by an environmental control system, which, among others, includes heat and moisture detectors, providing control and alerting the responsible personnel of the IT division.
- **Network and connectivity:** The network consists of a redundant networking system, utilising Fiber Optical Cabling where necessary and UTP cat-6 at the rest of the infrastructure. All active switching and routing equipment are set up in pairs, delivering redundancy and resilience. State of the art and award-winning systems (IDS, IPS, etc.) are utilized to maximize efficiency, speed and security. The whole network is using Fortinet's technology from end to end, providing centralised management, monitoring and alerting. Also, a SIEM system as a service is used to provide 365/24/7 management of potential threats. The connectivity to the internet is done by two independent ISP connections of 400MBps each, that each one of them has two distinct entrance points to the building and the Datacentre, using different media fibreoptic cables and microwave link. Monitored VPN access is available for remote administration and partners' access to specific parts of the infrastructure on demand. Furthermore, a hands-on system is present, strictly for the admins of the Datacentre. Different networks do exist for management, for access, two Demilitarized Zones, and a backup network.
- **Servers, Storage, etc:** The whole capacity of the Datacentre, sums up to 400 Intel Xeon Cores, 2 Tb ram, 50 Tb of SSD Storage, and 10 P4 Tesla 8Gb GPU cores, with the appropriate backup system. The provisioning of the VMs, is done via the Hyper-V 2019 Cluster system. Also, some individual servers do exist, providing an isolated environment for testing and for experimentation. Mission critical VMs, are placed on the active-active cluster system, providing high availability and redundancy. Also, the VOIP telephone system is hosted on the high availability cluster, providing teleworking capabilities via VPN. Some critical VMs, are also hosted on



external Datacentres with strict SLAs, providing availability and protection. All systems are covered by active support contracts and the critical systems from 4-hour mission critical support.

- **End users:** All users, have access to the internet and the intranet, via a couple of proxy-firewalls, that offer antivirus, IDS, IPS and protection from malicious sites. Two independent aggregated ISPs provide high speed access to the internet for maximum availability and security. The email is based on Office 365 A5 solution, providing suburb email services and the office suite. All software is original, and all the PCs are joined on a 2019 Active Directory Domain with policies well-configured to organisation's needs. In addition, port security is implemented on all access ports. All the headquarters are covered with Wi-Fi access for the visitors, on a separate vlan, where filtered access is allowed only on the internet. The users are setup on their own vlan, and the admins on the administrator's vlan, securing access to the servers. All systems and users are also monitored via a corporate antivirus solution that also provides data loss prevention and protection characteristics. All the desktop systems are covered by manufacturer's warranty, and power plugs deliver power via a central UPS system.

### Individual Exploitation Plan


<b>Exploitation Goals</b>	<p>The incorporation of VALKYRIES research outcomes into the solutions roadmap that will be considered by the Hellenic first responders will be a top priority of KEMEA exploitation plan. The scope is to engage the practitioner organisations named in the dissemination section above with the system demonstrations and use cases.</p> <p>Additionally, the activities foreseen to be undertaken during the project implementation can lead to the development of new commercial project ideas from the Hellenic first Responders in the implementation of the National Programme for the Internal Security Fund for the programming period 2020-2027, and the new National Strategic Reference Framework (2020-2027).</p>
<b>Topics/Domain</b>	<p>KEMEA's exploitation domains will be primarily the consultancy for First Responders operating under the supervision of the Hellenic Ministry of Citizen Protection and their affiliated entities.</p> <p>The impact on the current regulatory framework will be exploited with a series of proposals to policy makers.</p>
<b>Approach and Activities</b>	Regular meetings and frequent interaction with representatives from the above domains are foreseen.

### Individual Dissemination Plan

<b>Dissemination Goals and Target Groups</b>	<p>KEMEA as a scientific, consulting and research agency for the Hellenic Ministry of Citizen Protection will bring and promote VALKYRIES scope, goals, objectives and results to the attention of several First Responders organisations supervised by the Ministry. These organisations are the Hellenic Police and its border Guard Directorate, the Fire Corps and the General Secretariat for Civil Protection.</p> <p>There are also several organisations interacting with the Ministry, such as local and regional Civil protection entities and NGOs. These affiliated organisations will also be informed about the achievements and outputs of VALKYRIES in several awareness events and practitioner events.</p> <p>In addition, KEMEA is appointed "National Contact Point" for the protection of European Critical infrastructures (ECIs) - "ECIP contact point". Therefore, the benefits of VALKYRIES will be disseminated to practitioners and other stakeholders operating and supporting Critical Infrastructures Facilities in Greece and other EU Member States.</p> <p>Finally, KEMEA is member in several Pan-European networks of practitioners and other actors in the field of security like ILEAD, FIRE-IN, EXERTER and the coordinator of MEDEA. Members of the networks will be informed about the</p>
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	research outcomes of VALKYRIES in a number of networking activities and events like the Community of Users and EU Security research event. Overall, the foreseen target dissemination group is comprised of First Responders' organisations, public and private security organisations, Disaster Relief NGOs, policy makers, members from the research and academia, policy makers and representatives from the industry.
<b>Planned Activities</b>	<ul style="list-style-type: none"> <li>• Community of Users (CoU) annually events</li> <li>• Security Research Event (SRE) annually events</li> <li>• Industry days for First responders (IFAFRI Industry days)</li> <li>• Mediterranean Security Research Events</li> </ul>
<b>Indicative List of Events</b>	<p>The above activities plus:</p> <ul style="list-style-type: none"> <li>• A number of clustering activities between the <a href="#">SEC-21-GM-2016-2017 - Pan European Networks of practitioners and other actors in the field of security</a></li> <li>• Networking activities between various H2020 projects.</li> <li>• EOS and EARTO meetings with focus on promoting PPDR technology advancements.</li> </ul>

#### 4.1.13. HOSPITAL DO ESPÍRITO SANTO ÉVORA

<b>Partner Full Name</b>	<b>HOSPITAL DO ESPÍRITO SANTO ÉVORA EPE</b>		
<b>Short Name</b>	HESE	<b>Country</b>	Portugal
<b>Type</b>	PUB	<b>Website</b>	<a href="http://www.hevora.min-saude.pt/">http://www.hevora.min-saude.pt/</a>
<b>Official Logo</b>			
			
<b>Brief Partner Profile</b>			
<p>The Hospital do Espírito Santo Évora or HESE (<a href="http://www.hevora.min-saude.pt">http://www.hevora.min-saude.pt</a>) was founded in 1495 and is a reference hospital in the delivery of healthcare for the Alentejo region, serving more than 440,000 people with specialised medical services in the areas of maternity and paediatrics, cardiology, neurology, infecciology, nephrology, immuno-allergology, rheumatology, physical medicine and rehabilitation, pathology, pneumology, otolaryngology, psychiatry and mental health, psychiatry, childhood and adolescence and dermatology. Its differentiation is also reflected in the clinical and technological areas, with a strong focus on the availability of diagnostic and therapeutic technologies, such as Nuclear Medicine, Hemodynamic, Digital Angiography, Magnetic Resonance and Radiation Therapy. With a team of more than 1700 professionals, HESE develops its activity ensuring high patterns of technical-scientific performance, of effective and efficient resource management, of humanisation and promotion of its employees' professional development. Indeed, it is the Hospital's constant investment in human resources and the use of modern information and communication systems and technologies that support its high standards of technical and scientific performance, duly reflected in the quality of patient care.</p>			
<b>Role in Project</b>			
<p>As a public healthcare provider organisation, HESE provides the end-user perspective to VALKYRIES. In WP1, in Task 1.3, HESE will liaison with national authorities (e.g., national and regional civil protection, municipalities, LEAs) and, in Task 1.5, will assure compliance with the ethical and legal framework (national level) concerning dealing with exchange of healthcare data during emergency situations.</p> <p>HESE will support all activities in WP2, providing end-user recommendations to Task 2.1 (contribution to CONOPS, specifically on the integration of medical resources and information), Task 2.2 (healthcare data terminology), Task 2.3 (recommendations concerning integration with hospital systems), Task 2.4 and Task 2.5 (joint roadmap for standardisation, concerning healthcare systems).</p> <p>HESE will provide consultancy support in WP3, specifically Task 3.1 (provide recommendations concerning compliance with the ethical and legal framework), Task 3.2 (approaches for interoperability with healthcare systems), Task 3.3 (data-protection recommendations in healthcare systems), Task 3.4 (identify harmonisation needs) and Task 3.6 (sustainable exploitation, from a potential buyer perspective).</p> <p>In WP4, HESE will contribute to Task 4.1 (incorporation of data from ambulance or vehicles in hospital systems), Task 4.4 (assist digitalisation process related with first aid) and Task 4.5 (validation of instruments, wearables and data). In WP5, HESE contributes to Task 5.1 (identification of requirements for hospital triage, in the context of pre-hospital and emergency situations).</p> <p>In WP6, contributes to Task 6.2 (education and training of emergency staff at hospital) and Tasks 6.3, 6.4 and 6.4 (contributes to raise social awareness of hospital staff, collaboration with military personnel, liaison with national and regional civil protection).</p> <p>In WP7, contributes to all tasks (validation, demonstrations, evaluation), with special emphasys with Task 7.5, participation in demonstrator #1 (Spain-Portugal) by contributing to the definition and integration of resources and information in cases involving cross-border incidents between the Alentejo region and Extremadura region. HESE will allocate resources to support the joint demonstration. HESE will receive ambulances and victims from Spain.</p>			

## Key Personnel's CVs

**Mr. Luís Cavaco (male)** is a member of the Board of Administration of the Hospital of Espírito Santo, having a Degree in Sociology from Social and Economic Studies Superior School. At the HESE, his responsibilities include the oversight of the department of Information Systems and Technologies, as well as of the department of Facilities and Equipment and the supervision of innovation projects that refer to the health technologies, systems and equipment. He is also responsible for the career education and training of all personnel at HESE. In addition, he has more than thirty years of experience in the direction of projects with a significant economic and societal impact, first as the General Director of the Alentejo Regional Development Agency and, more recently, as the Director of the Economic Planning and Development Division of the Évora Municipality, where he was responsible for the oversight and decision-making of several development projects that embraced a significant economic impact in the Alentejo region. His curriculum also includes more than ten years as the General Director of the Alentejo Regional Development Agency, the result of a public-private partnership aiming to contribute to the promotion and development of the Alentejo region. The Agency gathered 66 local partners with relevant experience in all sectors of economic, social, research and development activities, geographically spread and deeply acquainted with local and regional reality.

**Dr. Manuel Gonçalves Carvalho, Md. (male)** is HESE's Clinical Director and the Director of the Surgical Treatment of Obesity Unit of the General Surgery service, with a broad experience in laparoscopic procedures. Since January 2020, he is also responsible for the Hospital's Prevention and Infection Control group, dealing with the COVID-19 disease. He led HESE's participation in the building of a national hospital reference network for General Surgery services and the development of the national telemedicine programme. He is a member of the Regional Oncology Commission since 2004 and of the National Commission on Surgical Treatment of Obesity since 2007 and a member of Administration Board of the Portuguese Society of Obesity Surgery and Metabolic Diseases.

**Mr. Ricardo Cabecinha (male)** is a senior engineer in HESE's Information Systems and Technologies Department, being responsible for developing and maintaining HESE's digital solutions and information technologies ecosystem, including the continuous access to national patient databases. Within these activities, he is coordinating the Hospital's digitalisation process concerning all clinical activity, as well as of the imagery complementing diagnosis and electronic prescription databases.

## Relevant Publications, products, services

n/a

## Relevant Projects / Activities / Initiatives

- **SPHINX** (Trusted digital solutions and Cybersecurity in Health and Care) (<https://cordis.europa.eu/project/rcn/220226/en>) – H2020 Health Research and Innovation Action aiming to introduce a Universal Cyber Security Toolkit, thus enhancing the cyber protection of the Health IT Ecosystem and ensuring the patients' data privacy and integrity. SPHINX toolkit will be easily adapted or embedded on existing, medical, clinical or health available infrastructures, including the IoT smart eHealth systems.
- **PHARMALedger** (<https://cordis.europa.eu/project/id/853992>) – H2020 and Innovative Medicines Initiative (IMI) 2 Joint Undertaking Project aiming to create a scalable blockchain platform validated through reference use cases in supply chain, clinical trials and health data that will serve trendsetters in the industry, thus enabling early adopters. PharmaLedger will serve as a single source of truth for the healthcare ecosystem and will be designed for efficient decentralised governance, wide adoption by the stakeholders of the ecosystem, compliance with extant and emerging standards and regulation, and end-to-end connectivity and interoperability.

## Infrastructure and Technical Equipment


HESE services are distributed for three buildings: the Edifício da Misericórdia, the Edifício do Espírito Santo and the Edifício Patrocínio. With more than 500 years, the convent-type building Edifício da Misericórdia is where the Administration, administrative services (human resources, financial services, legal cabinet, management planning and control, communication and marketing office, quality office, audit office) and support services (training cabinet, library, religious service, nutrition and dietetics, physical medicine and rehabilitation service, psychiatry and mental health and centralised sterilization service) are located. Coupled to the Misericórdia



building, the Edifício do Espírito Santo has been inaugurated in 1975 to house the majority of internment services, namely Cardiology, Paediatrics, Orthopaedics, Ophthalmology, Otorhinolaryngology, General Surgery, Urology, Plastic Surgery, Paediatric Surgery, Obstetrics and Gynaecology, Medical Specialties, STROKE Unit, Digital Angiography Unit and Interventional Cardiology, **General Urgency**, Paediatric Urgency, **intensive Care Unit**, Neonatology, Pathological Anatomy and Pharmaceutics. In addition, this building also gathers the Health and Safety at Work, Facilities and Equipment and the Procurement services. Finally, the Edifício Patrocínio was built in 2001 and hosts the services of Medicine, Stoma, Medical Oncology, Immunohemotherapy, Radiotherapy, Haematology, Neurology, Immuno-allergology, Dermatology, External Consultations and Psychiatric internment, as well as Technology and Information Systems, Patient Management and Social Services. HESE provides healthcare services for the Alentejo region (1/3 of the Portuguese territory), operating its own **General Urgency** and **intensive Care Unit**, receiving ambulances and citizens arriving in emergency situations. HESE A&E (accident & emergency) unit is ready on a 24/7 basis.

Individual Exploitation Plan	
<b>Exploitation Goals</b>	As a public institution, it is the Hospital's constant investment in human resources and the use of modern information and communication systems and technologies that support its high standards of technical and scientific performance, duly reflected in the quality of patient care. More specifically, HESE goal is to provide the best possible care to patients and victims, including in challenging situations, such as large-scale emergencies. In this regard, HESE sees with great interest the <b>adoption of VALKYRIES approaches and technologies in its organisation.</b>
<b>Topics/Domain</b>	Acute care (in hospital); Emergency services; Ambulance Services; Civil Protection Authorities.
<b>Approach and Activities</b>	Internal training activities; conduct meetings with relevant authorities.
Individual Dissemination Plan	
<b>Dissemination Goals and Target Groups</b>	Goal: create awareness of VALKYRIES relevance on interoperability and emergency response. Target Groups: Emergency services; Ambulance Services; Civil Protection Authorities, Policy makers.
<b>Planned Activities</b>	<b>HESE</b> aims to disseminate the project's results and project achievements through the publication of at least 2 scientific peer reviewed papers in renowned security-related conference proceedings. Also, <b>HESE</b> plans the participation in 2 healthcare related events (exhibitions, fairs, workshops, meetings), involving an audience of more than 100 participants. In addition, <b>HESE</b> will support cross-fertilisation and networking activities between the Project and relevant initiatives in the emergency field, including those involving National and Regional Civil Protection Authorities and Ambulance Services. <b>HESE</b> will contribute to the project's website and social media platforms. Finally, <b>HESE</b> will produce at least 3 blog entries associated with the Project that will be published in HESE official website.
<b>Indicative List of Events</b>	Peer-reviewed publications (journals, proceedings) and magazines: 1. Healthcare Informatics Research 2. The IOT Magazine 3. HealthTech Events (conferences, workshops, meetings): 4. Portugal eHealth Summit 5. IOT Solutions World Congress Networking and clustering: 6. Liaison (meetings) with National and Regional Civil Protection Authorities 7. Liaison (meetings) with Ambulance Services

#### 4.1.14. ARATOS.NET LTD

<b>Company Logo</b>		<b>Legal name</b>	<b>ARATOS NTOT NET Ltd</b>
		<b>Address</b>	Artemidos 36, 17561, Athens, Greece

PIC number	956343565	Company Type	SME
<b>Partner entity description and relevance:</b>			
<p><b>Aratos</b> is one of the first European companies to introduce value-added downstream services to citizens, by delivering products and services designed upon the users' needs and requirements. <b>Aratos</b> continuously provides high quality and commitment at its services and user management, by maintaining a strong and active profile on regional and international R&amp;D, adapting flexible market strategies, defining innovative means to optimize our deliverables and providing advanced solutions for Homeland Security.</p> <p>Our research and development are being devoted to making satellite-related technology available and approachable to end users, and our main areas of expertise vary among:</p> <ul style="list-style-type: none"> <li>● intelligent space-borne data acquisition, management, storage and on-demand processing</li> <li>● design of environmental models appropriate for interpreting EO indicators</li> <li>● wireless telecommunications,</li> <li>● GNSS navigation/location services</li> </ul> <p>Additionally, our work is being expanded to complementary fields on observation and ICT sciences, such as:</p> <ul style="list-style-type: none"> <li>● GIS modeling</li> <li>● RPAS (aerial) surveillance</li> <li>● Intelligent Internet architectures (Future Internet, Internet of Things, Clouds)</li> <li>● Mobile computing</li> <li>● Machine-to-Machine communication</li> </ul> <p>Our products and services are designed upon the above available tools and techniques and are namely focused on:</p> <ul style="list-style-type: none"> <li>● Disaster Management</li> <li>● Civil Protection</li> <li>● Security and Surveillance</li> <li>● Telecommunications</li> <li>● Environmental monitoring and protection</li> </ul> <p>The company is certified with ISO 9001:2013 and ISO/IEC 27001:2015.</p>			
<b>Expertise from previous and ongoing projects:</b>			
<ul style="list-style-type: none"> <li>● <b>IMPRESSIVE (Aratos.Net coordinator)</b> – Integrated Marine Pollution Risk assessment and Emergency management Support Service In ports and coastal environments, European Commission, H2020-DT-SPACE-1-EO-2018. Duration: 30 Months (running). The main goal of this project is to develop a universal-relocatable platform as a product for the real time management of marine pollution events in the wider area of harbours and the vicinities and the near coastal areas that are easy to manipulate and use from the control post at the harbour. The product will be consisting of an integrated operational service that will rely on: <ul style="list-style-type: none"> <li>○ A satellite monitoring service that processes Sentinel 1, 2 and 3 satellite images and Copernicus Marine products to identify polluting events (oil spills, and waste-water discharges), to generate alerts and to provide their position and features in near real time.</li> <li>○ A software package that once an event is located will provide forecast of its drift and fate, based on coupling between the pollutant fate and transport and the hydrodynamic numerical models, supporting decision making and the manoeuvring of the Autonomous vehicles with advanced positioning technologies.</li> <li>○ A set of risk mapping products based on the integration of time series of remote sensing and models products.</li> <li>○ A set of specifically designed Autonomous Surface Vehicles (ASVs) and a drone equipped with remote sensing instruments and a sampler device (on board of the ASVs) that will be remotely operated from the Headquarter Control Post for operational monitoring missions and/or accidental/illegal oil spills and other polluting events.</li> <li>○ A local rapid-response integrated system of near real time satellite/ASVs/drone/model/Forecast/risk mapping survey information and products, to support/improve the decision making process in any particular spilling event that may occur inside or outside the harbour or in a near coastal areas.</li> </ul> </li> <li>● <b>ECOPOTENTIAL</b> – ECOPOTENTIAL: IMPROVING FUTURE ECOSYSTEM BENEFITS THROUGH EARTH OBSERVATIONS, European Commission, H2020-SC5-16-2014. Duration: 48 Months (running). Terrestrial and marine ecosystems provide essential services to human societies. Anthropogenic pressures, however, cause serious threat to ecosystems, leading to habitat degradation and increased risk of collapse, with</li> </ul>			

related loss of ecosystem services. Knowledge-based conservation, management and restoration policies are needed to improve ecosystem benefits in face of increasing pressures. ECOPOTENTIAL will make significant progress beyond the state-of-the-art and create a new unified framework for ecosystem studies and management of protected areas (PA). ECOPOTENTIAL will focus on internationally recognized PAs in Europe and beyond; most PAs are UNESCO World Natural Heritage Sites, Biosphere Reserves, national parks and Natura 2000 sites. LTER sites and Large Marine Ecosystems are included. Best use of Earth Observation (EO) and monitoring data will be made possible by new EO open-access ecosystem data services (ECOPERNICUS). New modeling approaches including information from EO data will be developed, ecosystem services in current and future conditions will be assessed and the requirements of future protected areas will be defined. Open and interoperable access to data and knowledge will be assured by a GEO Ecosystem Virtual Laboratory Platform, fully integrated in GEOSS. Support to transparent and knowledge-based conservation and management policies, able to include information from EO data, will be given. Knowledge gained in the PAs will be upscaled to pan-European conditions and used for planning and management of future PAs. A permanent stakeholder consultancy group (GEO Ecosystem Community of Practice) will be created. Capacity building will be pursued at all levels. SMEs will be involved to create expertise leading to new job opportunities, ensuring commercial uptake and long-term continuation of services. In summary, ECOPOTENTIAL will use the most advanced technologies to improve future ecosystem benefits for humankind.

- **NEREIDS** – New Service Capabilities for Integrated and Advanced Maritime Surveillance, European Commission, FP7-SPACE-2010-1. Duration: 36 Months (closed successfully). NEREIDS brought innovative capabilities based on EO to make a best exploitation of available space technologies. NEREIDS brought enhanced EO capabilities by combining different sensors with innovative data fusion techniques. NEREIDS deployed a toolbox approach enabling share data and capabilities and support a common maritime picture. NEREIDS made an analysis of maritime surveillance in a cross-sector approach and brought best capabilities using best use of available space assets.
- **ARGOS** – Advanced Protection of Critical Buildings by Overall Anticipating Systems, European Commission, FP7-SEC-2012-1. Duration: 24 Months (closed successfully). Socioeconomic activities such as supply and distribution of gas or electricity and the Infrastructures that generate it or transport it (power plants, gas pipes), are vital to the day-to-day functioning of any country. How those Critical Infrastructures can anticipate any threat with the view of avoiding potential disruptions is the main goal of ARGOS project that will enhance the capacity of those Infrastructures in order to monitor, detect, and respond to a potential threat using ‘Early Warning Technologies’.
- **MEDEO** – Methods and tools for dual access to the EO databases in the EU and Russia, European Commission, FP7-SPACE-2010-1. Duration: 24 Months (closed successfully). The market of EO services is rapidly growing and becoming one of the main driving forces of innovative development both in Europe and Russia. At the same time, still the exchange of EO data available in both regions is a technical challenge. The consortium composed of the developers of an only Russian civil EO satellite system Resurs-DK and representatives of European EO research community and EO service industry aimed at reducing technical barriers for the joint use of EO data available both in the EU and Russia.
- **SEOCA** – GEO capacity building initiative in Central Asia, European Commission, FP7-ENV-2009-1. Duration: 24 Months (closed successfully). The goal of SEOCA was to promote European GEO-technologies in the region of Central Asia as a platform solution for the regional development challenges. As a result, the consortium managed via SEOCA to radically increase acceptance of GEOSS technologies by regional governments for national environmental services, meteorology, natural hazards prevention, geological explorations, etc.
- **THETIS** – Satellite System Development for Automatic Detection and Identification of Ship Signatures and Traffic, Greek General Secretariat of Research and Technology, DEL-17-2006. Duration: 22 Months (closed successfully). THETIS was a National Project regarding ship identification and monitoring system based on satellite data. The aim of the project was to develop a system to monitor closed sea areas such as the Gulf of Patras, which would improve the management capacity and safety of maritime transport, acting, when required, in addition to the existing ground surveillance systems. The implementation of the THETIS system was based on the use of polarization SAR data from satellites of the European Space Agency (ESA) for all possible weather conditions, day and night.
- **ECM-GR** – Earthquake Crisis Management System for Greece, European Space Agency, 20355-06-NL-US. Duration: 18 Months (closed successfully). Project’s objectives were: To design a prototype service for civil protection departments to be used in the case of natural hazards and specifically in the case of major earthquake

incidents. To demonstrate benefits of innovative technologies (Satcom, wireless) for field operators, decision makers and end-users, to design an integrated service which will be based on EO data, GIS technologies and satellite telecommunications. This project acted as a start-up for similar service provision in the case of other natural or man-made hazards or for telemedicine applications, direct and rapid data distribution from value-added services and experts to on-field operators and local decision makers, collaborative working sessions between experts, decision makers and on-field operators.

- **SAFECITY** – Future Internet Applied to Public Safety in Smart Cities, European Commission, FP7-2011-ICT-FI. Duration: 24 Months (closed successfully). SafeCity dealt with smart Public safety and security in cities. The main objective was to enhance the role of Future Internet in ensuring people feel safe in their surroundings at time that their surroundings are protected. SafeCity was the result of the elaboration of a vertical Use Case Scenario based on Public Safety in European cities. The main goal of this project was to collect specific requirements driven by relevant users on the Future of Internet versus to the generic ones that will be collected through other objectives.

#### Infrastructure and equipment:

The company possesses a Command & Control Centre that is capable to support several activities from different fields (space, homeland security, GIS mapping, image analysis and processing). Moreover, the company owns and runs a fully equipped Satellite Ground Station continuously receiving data from EUMETSAT.

#### Relevant publications:

N/A

#### Key Personnel:

**Dr. Nikos Bogonikolos, Director (male)** – He received his degree in Mathematics, from the Department of Mathematics, University of Patras, Greece in 1985. He was awarded his MSc in 2002 and his PhD in 2005 from the Department of Cybernetics, Kharkov National Economic University, Ukraine. In the meantime, he has been awarded the title of Honorary Doctor for the National Academy of Management, Kiev, Ukraine in 2004. He has been the President, Managing Director and shareholder of various business entities related to Technologies, Education and Training, Innovation, Management Consulting and European Projects. He has been the President and Managing Director of Aratos since 1995, with experience in Project Management of more than 177 European and more than 70 in National scale in the areas of Space, Security and ICT.

**Mrs. Eleftheria Tsialtzoudi, Financial Director (female)** – She received her degree from the Department of Economy and Administration of Technical Educational Institute of Patras, Greece in 2003. She gained additional management, financial and communication expertise working for five years in the organization of a sports radio station in Patras, Greece. Subsequently, she worked for five years in the organization, preparation and implementation of European and National funded educational Programs in a private education school of Computers and Accounting programs in Patras, Greece and in other private consulting firms. In 2016 she started working in Aratos.

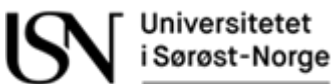
**Dr. Ioannis Dontas, Senior Consultant (male)** – He received his degree in Physics, from the Department of Physics, University of Patras, Greece in 1997 and his PhD in 2003 from the Chemical Engineering Department, University of Patras, where he also conducted postdoctoral research in Material Science until 2007. He joined Aratos in 2013 as Senior Consultant in EU projects. He has experience in EU-funded projects coordination for public and private entities and design, development and implementation of private works regarding ICT, Space and Homeland Security solutions. He has published 10 scientific papers.

**Mr. George Makropoulos, Network & Telecoms Engineer (male)** – He is currently a PhD candidate at the department of Informatics and Telecommunications at the National and Kapodistrian University of Athens. He holds a Master's Degree in Advanced Informatics and Computing systems from the University of Piraeus and an undergraduate degree in Electronic Engineering, Faculty of Technological Applications from University of Applied Sciences in Athens. Areas of interest and expertise include Networking, Hardware Engineering and Telecommunications.

### 4.1.15. UNIVERSITY OF SOUTH-EASTERN NORWAY

Partner Full Name	University of Southeastern Norway		
Short Name	USN	Country	Norway
Type	University	Website	www.usn.no



<b>Official Logo</b>		
		
<b>Brief Partner Profile</b>		
<p>USN is a quit new university situated south of the capital of Norway (Oslo). We offer a wide range of studies in both humanities, natural science and technology. We focus much on technology for maritime operations like navigation, autonomy, communication and similar areas. We cooperate closely with maritime authorities nationally as well as international. The national maritime rescue organization have laboratories and training centre locally.</p>		
<b>Role in Project</b>		
<p>Task manager and contributor in several tasks of the project based on the expertise that USN is having in other different R&amp;D projects and initiatives. USN will be also doing the whole coordination of the Use Case 4 (UC#4) being established in between Norway and Holland as a clear example of cross-sector and cross-border scenario involving different players in different countries.</p>		
<b>Relative Expertise / Experience</b>		
<b>Field of expertise</b>	<b>Description of the expertise or experience related to this expertise</b>	<b>Added value for the project</b>
<b>Autonomy</b>	USN does R&D on all kinds of autonomous units for use at sea, land and air and can control and manage several units	It is important to collect as much information as possible from disaster areas. It is normally to high risk to send in manned units and our autonomous units could be a good alternative.
<b>Electronics</b>	USN develops electronics related to our main research areas like autonomy and sensors	Electronic design and development are key knowledge in our area.
<b>Sensor technology</b>	USN is one of the key players in developing all kinds of sensors ranging from imaging to biology.	Sensors are used to identify all kinds of issues and people as well
<b>Communication</b>	Experience in different kind of communication technology from short range (BLE) to MBR (Maritime Broadband) and maritime 5G	Communication is very important in collecting information
<b>Key Personnel's CVs</b>		
<ul style="list-style-type: none"> <li>• Marius Tannum</li> <li>• Jon Herman Ulvensøen</li> <li>• Paal Aamaas</li> </ul>		
<b>Relevant Publications, products, services</b>		
<ul style="list-style-type: none"> <li>• Test facilities for autonomous units of any kind</li> <li>• Simulator capabilities</li> <li>• More publications on autonomy, human factor and similar</li> </ul>		
<b>Relevant Projects / Activities / Initiatives</b>		
<ul style="list-style-type: none"> <li>• Autonomous test arena Horten</li> <li>• Autonomous water shuttles for urban areas</li> <li>• Drone technology on and under water as well as in the air</li> </ul>		
<b>Infrastructure and Technical Equipment</b>		
<ul style="list-style-type: none"> <li>• Autonomous test arena Horten</li> <li>• Maritime Simulators</li> <li>• Maritime training centre</li> </ul>		

<b>Individual Exploitation Plan</b>
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<b>Exploitation Goals</b>	Improve situation awareness in all organization related to maritime rescue operations as well as politics (Departments, national government and so on)
<b>Topics/Domain</b>	Maritime operations
<b>Approach and Activities</b>	Participate in conferences related to the topic. Teach and educate future maritime personnel and rescue teams

<b>Individual Dissemination Plan</b>	
<b>Dissemination Goals and Target Groups</b>	Share knowledge and teach relevant personnel. Typical target groups will be all organizations involved in rescue and cleaning up operations on sea
<b>Planed Activities</b>	Teach courses at the university, both as a part of our running MSc and BSc activities and separate supplementary courses.
<b>Indicative List of Events</b>	Major national and international conferences related with the main topics of the cross-sector and cross-border maritime use case led by USN in the project.



#### 4.1.16. AZIENDA REGIONALE EMERGENZA URGENZA

<b>Partner Full Name</b>	<b>AZIENDA REGIONALE EMERGENZA URGENZA</b>		
<b>Short Name</b>	AREU	<b>Country</b>	ITALY
<b>Type</b>	REGIONAL PUBLIC COMPANY	<b>Website</b>	www.areu.lombardia.it

##### Official Logo



##### Brief Partner Profile

AREU is instituted to develop the integration of the intra and extra hospital healthcare emergency, to ensure a uniform and effective quality in territorial emergency rescue, to coordinate the transportation of organs, tissues and teams in making harvesting and transplantation, to acquire the assets of exchange and clearing of blood and blood components. AREU takes care of more than 10 Million people; it is organized like a regional public service corporation. AREU has also been selected as the organization responsible to build the first Italian PSAP 1 devoted to the management of the N112 in Lombardia region.

##### Role in Project

AREU will contribute to the WP1 (T1.2 and T1.3), WP2 (T2.1 and T2.3), WP4 (T 4.1 and T4.5) WP6 (T 6.5) WP7 (T7.5, T7.6, T7.7, T7.8) of the project as expert of territorial emergency rescue. AREU will lead Task 5.2, focused on maintenance, logistics and Deployment as part of WP5 (Common practices and operational procedures for First Aid Response).

##### Relative Expertise / Experience

Field of expertise	Description of the expertise or experience related to this expertise	Added value for the project
<b>TERRITORIAL EMERGENCY RESCUE</b>	AREU takes care of more than 10 Million people. Its main objective is the coordination of all the territorial emergency activities on the regional territory. This includes people, processes, organisation, technology for all the resources used in out-of-hospital healthcare Emergency system. AREU also has experience and expertise in management of national and international context of disaster medicine (in ex earthquake...)	Knowledge on National and International standards and protocols. Deep experience in many fields of disaster medicine: healthcare, logistic, technology...

##### Key Personnel's CVs

**Giuseppe Sechi (male):** Degree in Medicine and Surgery / School of Specialization in Hygiene and Preventive Medicine (Public Health)

- 2019 - Present: Chief Medical Officer, AREU Lombardy.

- March 2019: Chief Medical Officer of Hospital Unit ASSL Cagliari, Sardinia.
- 2014 - 2019: Chief Executive Officer, Department of Hygiene and Health and Social Assistance, Sardinia Region.
- 2009 - 2014: Chief Medical Officer, San Gavino Monreale - ASL n. 6 Hospital, Sanluri, Sardinia Region.
- 2006 - 2009: Director of the Hospital Assistance Service, Department of Hygiene and Health and Social Assistance, Sardinia.

**Marco Botteri (male):** MD Anaesthesiologist and Emergency Physician

- 2019- Present: AREU Lombardy HQ (Regional EMS Agency) Milan: EMS Clinical and Scientific/Research Activity.
- 2002-2016: ICU and ER physician, Spedali Civili, Brescia. 118 EMS and Rescue Medical Dispatch Centre physician, Brescia
- 2015-2016 Master in Mountain Emergency Medicine
- 2015- Present Physician HEMS Brescia
- Instructor of International Trauma Life Support (ITLS)

**Guido Francesco Villa (male):** PhD Anaesthesiologist and Emergency Physician.

- 2020-Present: AREU Clinical/Scientific Consultant. 2012-2019: AREU Lombardy HQ (Regional EMS Agency) Milan: EMS Clinical and Scientific/Research Activity.
- 1999-2012: Head of 118-EMS and Rescue Medical Dispatch Centre - Lecco Province, Manzoni Hospital. 2007-2014: Scientific Director of N&A, Italian EMS/Rescue Journal.
- 1992-1999: ICU and ER Deputy Head, Scientific Institute of Research, San Raphael Hospital, Milan. 1982-1992: Assistant, Chair of Anesthesiology and ICU, HSR Milan, Italy.

**Alex Zambroni (male):** Graduates in management engineering (logistics operation) and master's degree in computer science.

- 2008-Present: AREU Lombardy HQ (Regional EMS Agency) Milan: Logistics Director.
- 1999-2008: EMT of 118-EMS and Rescue Medical Dispatch Centre - Lecco Province, Manzoni Hospital.

**Federico Federighi (male):** Anaesthesiologist and Emergency Physician

- 2001-European Master in Disaster Medicine EMDM
- Present: AREU Lombardy, Director of Maxi-emergencies Service
- 2010-2020: Director of the Health Resources Service, of the Civil Protection Department, Presidency of the Council of Ministers, Rome
- 2001-2010: Physician, Helicopter Emergency Medical Service "118" of Como, Lombardy.
- 1995-2001: Physician, Emergency Medical Service "118" of Firenze, Tuscany.
- 1993-1994: Volunteer Physician of NGOs, for humanitarian operations Somalia and Croatia.
- 1990-1992: Medical Officer (Second Lieutenant), Italian Air Force.
- 1989: Volunteer Physician of NGOs, for humanitarian operations in Congo.

#### Relevant Publications, products, services

- Villa GF, Kette F et al. Out-of-hospital cardiac arrest (OHCA) Survey in Lombardy: Data analysis through prospective short time period assessment. September 2019 Acta bio-medica: Atenei Parmensis 90(9):64-70
- Villa GF, Botteri M et al. Medical Air Transport – Fixed Wing MEDEVAC – IL TRASPORTO AEREO SANITARIO AIR MEDEVAC Book
- Villa GF, Frigerio C, et al Pain Relief in Emergency Situation: AREU Guidelines
- Perego E, Balzarini F, Botteri M et al. Emergency treatment in Lombardy: a new methodology for the pre-Hospital Drugs management on Advanced Rescue Vehicles Acta bio-medica: Atenei Parmensis 2020 Apr 10;91(3-S):111-118
- Sechi GM, Migliori M et al. Business Intelligence applied to Emergency Medical Services in the Lombardy region during SARS-CoV-2 epidemic Acta bio-medica: Atenei Parmensis 2020 May 11;91(2):39-44.

#### Relevant Projects / Activities / Initiatives

AREU aims to provide an effective service network by working to aggregate Emergency Territorial Rescue, Emergency Hospital and territory, in order to let the organization go to a hospital for all activities related to their

AED (Accept and Emergency Department). The model of network is “Hub and spoke”. Hubs are the centres of reference, where there is an adequate concentration of casuistry and where the activity is integrated with the peripheral centres (SPOKE) - hospitals without teams of highly specialized centres, that ensure continuity and transfer, when necessary, to patients at the Centre hub quickly and effectively as well . Spoke ensures relocation from Hub of patients already treated, in order to play the role of optimal filter based on the severity of cases.

### Infrastructure and Technical Equipment

The Agenzia Regionale Emergenza Urgenza (AREU) has fully accepted the Regional proposals by creating those changes in the EMS with:

- A flexible and dynamic CEO staff.
- 12 Joint Territorial Systems (JTS-AAT) are placed on the regional territory; covers approximately the provincial area of competence and have to coordinate all emergency vehicles working on its territory. The JTS also choose strategical location for crews and rescue vehicles.
- 4 Regional Emergency Service Operative Centres (SOREU) covering larger than provincial-based territories. These are linked together by two large centralized servers, one of these acting as a backup in case of crash or system failure.

The peculiarity of AREU’s EMS is the capability to involve every rescue Agency, Association and Social Cooperative that make available personnel, rescue means and equipment in order to provide the Basic Rescue Service. Under the practical point of view, the rescue activity is performed by:

- Physician, nurses, and technicians provided by the local Hospital Companies of the Health Regional Service as defined by specific agreements between AREU, Hospital Companies, Scientific Institutions, and Local Health Services.
- Volunteers and employees belonging to rescue Agencies, Associations and Social Cooperatives which provide their aid as either rescue volunteers or drivers.

Presently there are 5 helicopters located in Sondrio, Como, Bergamo, Brescia, and Milano. The five helicopters adequately cover the whole regional land both during the day and during the night.


### Individual Exploitation Plan

<b>Exploitation Goals</b>	AREU will be aiming use the best outcomes of the VALKIRIES project to improve and modernise its way to manage it specific mission and also improve and modernise its training and educational programs
<b>Topics/Domain</b>	Emergency territorial rescue.
<b>Approach and Activities</b>	AREU is particularly interested in the opportunity of work with different and international team. This maybe can open new opportunity and new partnership

### Individual Dissemination Plan

<b>Dissemination Goals and Target Groups</b>	The dissemination plan of AREU will aim to ensure adequate dissemination of the project’s results.
<b>Planed Activities</b>	Communication to scientific world as permitted by accessibility and protection policy
<b>Indicative List of Events</b>	Oral presentation, publications

#### 4.1.17. HELLENIC RESCUE TEAM

<b>Partner Full Name</b>	ELLINIKI OMADA DIASOSIS SOMATEIO (Hellenic Rescue Team)		
<b>Short Name</b>	HRT	<b>Country</b>	Greece
<b>Type</b>	Non-Profit, Research Organisation	<b>Website</b>	www.hrt.org.gr
<b>Official Logo</b>			
			
<b>Brief Partner Profile</b>			
<p>Hellenic Rescue Team (HRT) is a volunteer non-profit Search and Rescue (SAR) organisation, with a human potential of 2.000 volunteers all over Greece and Headquarters in Thessaloniki. HRT participates in SAR missions in cases of urgent needs and massive disasters, either in Greece or abroad. It is acknowledged by Civil Protection Authorities in Greece and EU and a member of the United Nation - International Search and Rescue Advisory Group (UN-INSARAG), and the only Greek member in the International Maritime Rescue Federation (IMRF) and the Internationale Kommission fur Alpines Rettungswesen/Commission Internationale de Sauvatage Alpin (IKAR/CISA). HRT's main mission is the search and rescue of people in need and the organisation of Aid Missions in natural and manmade disasters all over the world, nevertheless a major objective (and vital tool to achieve our mission) is Research and Development in the area of Search and Rescue, crisis and crowd management, telecommunications, ICT for first responders.</p> <p>Within the Hellenic Rescue Team area, there are seven specialised departments, mainly:</p> <ul style="list-style-type: none"> <li>• <b>USAR - Massive Disasters:</b> HRT has at its disposal a team in state of alertness, fully technologically equipped. HRT's corporate planning is to intervene in any part of the world, in case of earthquakes, floods and extended catastrophes as Turkey and Athens (99), Morocco and Algeria (03), Pakistan (04), Haiti (2010).</li> <li>• <b>Mountain Rescue:</b> the richest in experience HRT Department, having participated in over 100 missions of Search and Rescue also has all the appropriate apparatus and the perfect training to intervene in mountain accidents and air crashes, accomplishing even the most difficult operations.</li> <li>• <b>Water Search and Rescue:</b> its members are experienced scuba divers, speed-craft controllers, sailors, bay-watchers, and support crew who are participating in Search and Rescue (SAR) at sea, rivers, and lakes. They are in constant cooperation with the Hellenic Coast Guard and the Hellenic Air Force. Most recently, HRT through its Water Rescue Department (WRD) was very active in the refugee crisis in the Eastern Aegean saving numerous lives. Furthermore, through its partners in IMRF, HRT has increased substantially its ability in sea rescue through specialised training.</li> <li>• <b>First Aid:</b> professionals in health domain support the rescue departments of HRT providing first aid during our missions. In addition, they train new HRT's members in First Aid.</li> <li>• <b>Research, Technology and Telecommunications:</b> the development of the specialised knowledge of HRT's members led to the exploitation of modern technology and it is focusing on creating applications and devices useful in Search and Rescue. The Department has a portfolio of a variety of pioneer inventions.</li> <li>• <b>Humanitarian Missions:</b> this department collects, carries over and distributes humanitarian aid to populations suffering from disasters and abnormal crisis. In addition, in cooperation with the Greek Government as well as the European Union (ECHO), HRT is in charge of the management of aid programs towards third countries. In the past, some of these countries have been Afghanistan (1999), Iraq and Iran (2004), Indonesia and Sumatra (2005), Lebanon (2006), Gaza (2009), Haiti and Chile (2010).</li> <li>• <b>Training:</b> HRT organises special schools and seminars by professional trainers, in Greece and abroad, in order to provide its members with all the technical knowledge that is required.</li> </ul>			
<b>Role in Project</b>			
<p>Hellenic Rescue Team will assume the role of the end user participating and supporting primarily in the definition of user requirements throughout the whole process of development from the technical partners. Moreover, HRT will participate in the pilots in order to test and evaluate the proposed procedures. Last but not least, HRT will also support all dissemination and exploitation activities of the project and support the lead partner wherever is required.</p>			

Relative Expertise / Experience		
Field of expertise	Description of the expertise or experience related to this expertise	Added value for the project
Search and Rescue	HRT is a search and rescue organisation with an extensive experience with operations in various fields (mountain, sea, urban, wildfires)	HRT's experience in SAR operations in various fields will offer an overall approach when examining and analysing existing procedures
Volunteers	HRT is a volunteer organisation. All its rescue members are volunteers	Volunteers are a valuable part in SAR operations and during various major crisis. HRT will support the standardisation and examination of operational procedures from the volunteers' point of view.
First Aid	HRT has a dedicated first aid department	HRT's first aid department will offer its experience in the relative tasks and also support the development of the procedures for better cooperation between professional and volunteer first responders when it comes to providing first aid in mass casualty events,
Key Personnel's CVs		
<p><b>Mr. Iosif Vourvachis</b> (male) is a Civil Engineer with an MSc equivalent degree (5year course) from the Aristotle University of Thessaloniki and an M.B.A. at University of Macedonia, Greece, in 2004. He has a long experience in managing EU projects and has participated in many FP7 and other EU funded projects as a team leader or project manager. He coordinated WP and Tasks in previous projects (like FP7 COSMIC, FP7 COSMIC, FP7 CONCORDE, H2020 beAWARE). He also coordinates HRT R&amp;D team in all their project related tasks as well as the financial management of the project. He holds the position of Development Manager in HRT and will act as HRT's project manager in all HRT's EU projects.</p> <p><b>Mr. Alexis Liamos</b> is the Operations Director of HRT, with more than 18 years of experience in managing more than 300 SAR operations in the field, both nationally and abroad. He specializes in the communications field. He has participated in in national and European research projects (i.e FP7 project COSMIC). He will participate in the definition of end-user requirements, the demonstration and evaluation activities of the project and the formulation of the training requirements.</p> <p><b>Mr. Zafeiris Trobakas</b> is the Director of Training of HRT since the establishment of the organisation over 26 years ago. He is responsible and oversees all training carried out in HRT, in all fields of operation (mountain, sea, urban, first aid, etc.) in cooperation with the trainers of the relative departments. He has an extensive experience of more than 35 years in training first responders. He has been a member for six years in ICAR workshops that focused on mountain rescue. Furthermore, he has been a trainer for mountain rescue for the special Hellenic Special Forces in 2000, 2001, 2006 and 2009 and he has trained a branch of Turkish Fire Department in Duzceili in 2004. Furthermore, Mr Trobakas has been a speaker in various mountain rescue seminars and in Greece and among other he has carried out studies based on observation and experiments on meteorology and telecommunications in remote mountain areas and how mountain rescue operations can be affected by them.</p>		
Relevant publications, products and/or services		
<p>HRT is an experienced Search and Rescue organisation with a record of numerous Search and Rescue operations in various fields and many events, relevant to the project's core idea.</p> <p>Moreover, during the past five years HRT participated in various research projects where HRT had similar roles to the respective proposal: definition on requirements and field testing.</p> <p>HRT is not new to R&amp;D activities. Throughout the last years and mainly with its own limited financial resources, HRT successfully implemented (among others) the following projects:</p> <ul style="list-style-type: none"> <li>• "Detecting survivors in wreckage: A new antenna and SW for BIORADAR BR 402". Gathering feedback and experience from participation in numerous SAR missions around the world, our rescuers come up with a set of requirements and specifications that survivor detection equipment should have. HRT fully modified a small hi tech commercial system for detection and evaluation of small mechanical movements like human</li> </ul>		



beings. The system uses electromagnetic waves (radar waves) through obstacles. It works on the principle of send and receive, using a standard PC to analyse the received signals. HRT, after many experiments and field testing, created a new improved antenna and rewrote the software of the RADAR in order to substantially improve its reliability and speed. The RADAR is still in operation with great success in the field.

- “Crisis Management Radio Network Design and Deployment”. Communications are vital for all first responders and rescuers. The safety of the people in distress and of the rescuing teams depends on reliable and sound communication channels. Mobile networks do not provide adequate coverage especially in isolated areas and even if they do, their cost is often unaffordable. Very High Frequency – Ultra High Frequency (VHF-UHF) communications provide a solution but the problem of limited coverage of portable VHF devices still exists. Our telecommunications research department has developed a unique radio network composed of links and repeaters focusing on dangerous and unapproachable locations. The final locations were selected after a long-term allocation study by our teams. All radio points (links and repeaters) are autonomous and equipped with batteries, photovoltaic panels, thunder protection and secured from strong wind and cold. Thanks to such researchers, HRT developed a new methodology for radio network deployment in rough conditions and new protocols and methods for setting up radio communications in difficult, isolated mountainous terrains. Recently, HRT managed to link this radio network with the Internet and transfer radio signals in remote locations even abroad. HRT is constantly updating and maintaining the system and managed to establish and demonstrate in a field exercise communication with a diver 15m below water and with a civil aviation airplane in flight just outside Greek borders.
- “The effect on Radio meteorology in radio signal transition”: a long-term study by HRT on the use of radio waves and radio equipment (e.g. links and repeaters) for controlling devices and transferring data to and from remote locations.
- “Innovative methodologies for SAR missions with the use of helicopters”: Manual and Training material/seminars.

#### Relevant Projects / Activities / Initiatives

- H2020 DRS02-SU-SEC “**Search and Rescue**” - Emerging technologies for the Early location of Entrapped victims under Collapsed Structures and Advanced Wearables for risk assessment and First Responders Safety in SAR operations
- H2020 SEC “**beAWARE** - Enhancing decision support and management services in extreme weather climate events”
- FP7 SEC “**CONCORDE** - Development of Coordination Mechanisms During Different Kinds of Emergencies”.
- FP7 SME “**RESCUECELL** - Portable Kit For Detecting Trapped And Buried People In Ruins And Avalanches”.
- FP7 SEC “**COSMIC** - The COntribution of Social Media In Crisis management”.

#### Infrastructure and Technical Equipment

- A van which serves as a mobile operations centre called “Hermes”, which carries all necessary equipment for managing a crisis, such as a communication centre, internet connection, satellite communication, etc.
- 19 rescue vessels for sea rescue.
- 2 rescue runners.
- 2 snow vehicles.
- Suitable suits for ground personnel, who are involved in fire response.
- Various first aid and SAR equipment.
- Nationwide communication network.
- 2 mobile Wi-Fi communication antennas

#### Individual Exploitation Plan

<b>Exploitation Goals</b>	The results of the project will be incorporated in HRT’s rescue mechanism in order to strengthen its role as well as its efficiency during an event and to support national authorities.
<b>Topics/Domain</b>	HRT’s exploitation domain is primarily the support of national authorities and more specifically other First Responders who operate in SAR missions in cases of urgent needs and massive disasters, either in Greece or abroad.

<b>Approach and Activities</b>	HRT plans to adopt the methodologies in its training exercises as also to propose similar training procedures with authorities and other volunteer organizations. Last but not least, HRT will use the platform as a basic tool in future projects so as to promote its use and to support its further development.
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<b>Individual Dissemination Plan</b>	
<b>Dissemination Goals and Target Groups</b>	HRT will share the project's results with relevant stakeholders such as other rescue volunteer organizations and national rescue authorities like Hellenic Fire Brigade and EKAV (National EMS).
<b>Planned Activities</b>	HRT will disseminate the project through its social media accounts and its website. Additionally, HRT aims to disseminate the project in various national and international conferences in which the organization participates.
<b>Indicative List of Events</b>	HRT is a member in ICAR and in IMRF and will support the dissemination of the project in the respective regional and international events.



## 4.2. Third parties involved in the project

### 4.2.1. INDRA SISTEMAS S.A.

#### a) Description of the third party:

Indra Factoría Tecnológica S.L.U (IFT), provides horizontal and innovative solutions to Indra Sistemas S.A (Indra) based on emerging technological fields like Artificial Intelligence, Digitalization, Cybersecurity, Simulation, 5G/IoT or Unmanned Vehicles; to the Indra's main business verticals, including Transport and Traffic, Energy and Industry, Public Administration and Healthcare, Finance, Insurance, Security and Defence, Space, and Telecom. In addition, IFT has have a portfolio of external clients over the world, with a special focus on Europe and Latin America markets.

Indra Factoria Tecnologica S.L.U is 100% owned by Indra Sistemas S.A. Description and justification of the foreseen tasks to be performed by the third party: IFT will bring its expertise in all work packages except WP6, which will not participate. Within WP1, IFT will mainly carry out management and dissemination related tasks. For WP 2, while Indra has minor participation, IFT will be responsible for analysing European national certification initiatives and international efforts to identify commonalities and differences. Regarding WP3 IFT will only be involved in overseeing certification related tasks. The second biggest contribution of IFT is in WP4 where will be in charge of the study and identification of technologies that can have a positive impact on health support wearable devices. For WP5, the tasks in which IFT will be participating are related to the definition of an information network which will facilitate decision making for emergency commanders. Finally, in WP 7 IFT will be responsible for tasks related to the design and development of virtual laboratories and testbeds to combine and test the components and procedures to be defined in the previous WPs.

#### b) Work Packages effort distribution:

WP		PM IS	PM IFT
WP1	Project Management and Communication	18	22
WP2	Design Principles and harmonization Tactics	1,5	2,5
WP3	Responsible innovation, certification, and exploitation	23	1
WP4	Equipment and ICT enablers for First Aid Responses	2	16
WP5	Common Practices, and operational procedures for First Air Responses	4	2
WP6	Cooperation, Education and Training for First Aid Responses	10	0
WP7	Reference Integration, Evaluation and Demonstration	5	8

#### c) Actions performed:

IFT is not going to perform major parts of the actions.

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
Does the participant envisage that part of its work is performed by linked third parties <sup>1</sup>	Y

<sup>1</sup> A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the [Model Grant Agreement](#)).

Indra is one of the leading global technology and consulting companies and the technological partner for core business operations of its customers world-wide. It is a world-leader in providing proprietary solutions in specific segments in Transport and Defence markets, and the leading firm in Digital Transformation Consultancy and Information Technologies in Spain and Latin America through its affiliate Indra Factoría Tecnológica S.L.U, henceforth Digital Labs. Digital Labs provides horizontal and innovative solutions based on emerging technological fields like Artificial Intelligence, Cybersecurity/Cyberdefence, Simulation, 5G/IoT or Unmanned Vehicles; to the Indra's main business verticals, including Transport and Traffic, Energy and Industry, Public Administration and Healthcare, Finance, Insurance, Security and Defence, Space, and Telecom. In addition, Digital Lab has a portfolio of external clients over the world, with a special focus on Europe and Latin America markets.

As Indra's flagship on closing the gap between disaster management and the digitalization of the sector, Indra Digital Labs will guide Indra Sistemas when defining its role at the VALKYRIES design principles (T2.1) and semantics and terminology (T2.2). Digital Labs will participate in the activities within four technological streams at WP4, providing its expertise at trusted communication infrastructure (T4.2), mobile C&C (T4.3), digitalization (T4.4) and IoT wearables (T4.5). In addition, Digital Labs will contribute to explore how these technical contributions may improve Command and Control and support to operational decision-making (T5.3) and Common Operational Picture and warning (T5.4). By taking advantage of its large experience in cross-sectorial cyber training, Digital Labs will contribute to enhancing the VALKYRIES capabilities for Resource Federation and trusted information sharing (T6.1), Education and Training for first aid responses (T6.2) and Raising practitioner and social awareness (T6.3). Indra Digital Labs will be involved in the activities related with the generation of suitable datasets to be addressed at T7.1, involving the Digital Labs' Cyber Range platform among others own COTS solutions. During this activity cyber-physical scenarios will be defined and virtualized in a safe and isolated environmental (Cyber Range), which will serve for generating synthetic traits of legitimate and malicious situations.

Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
Does the participant envisage that part of the work is performed by International Partners <sup>2</sup> (Article 14a of the General Model Grant Agreement)?	N

<sup>2</sup> 'International Partner' is any legal entity established in a non-associated third country which is not eligible for funding under Article 10 of the Rules for Participation Regulation No 1290/2013.

#### 4.2.2. SERVICIO DE URGENCIAS Y EMERGENCIAS DE LA COMUNIDAD DE MADRID (SUMMA112)

##### a) Description of the third party:

The organization Servicio Madrileño de Salud (f) is the administrative and management structure that integrates almost all public hospitals, primary care centres, emergency services and every public health service of Madrid's Regional Public Health System. SERMAS is therefore the legal representative (beneficiary) of the main public medical centres of Madrid's Regional Health System. Usually SERMAS delegates authority to each Research Foundation of the different hospitals and Primary Care Directorates in order to manage the research actions on behalf of SERMAS, as this institution, being public, has difficulties managing the project funds.

Also belonging to SERMAS, there is the Fundación de Investigación e Innovación Biomédica de Atención Primaria (Foundation for Biomedical Research and Innovation in Primary Health Care, FIIBAP). This Foundation aims at promoting health related research and innovation. FIIBAP coordinates and manages research and innovation projects of behalf of SERMAS, holding the legal capacity to handle the financial and administrative aspects of the research groups involved in research projects, including all issues relating to project management, employment and payment of additional personnel, purchase of equipment and consumables, etc.

The Foundation depends of the Healthcare Coordinator General Directorate within SERMAS. The EC contribution will be directly handled by FIIBAP as an entity of SERMAS and will participate in the project as a Linked Third party of SERMAS (Art. 14 MGA). SERMAS and FIIBAP have a legal link through a General Collaboration Agreement signed between the Community of Madrid, the Madrid Health Service and the Primary Health Care Biomedical research and Innovation Foundation of the Community of Madrid (a.k.a. FIIBAP), for the Management and Coordination of Biomedical research and Innovation Developed in the field of primary health care.

##### b) Work Packages effort distribution:

WP		PM SERMAS	PM FIIBAP
WP1	Project Management and Communication	0	6
WP2	Design Principles and harmonization Tactics	2	5
WP3	Responsible innovation, certification, and exploitation	1	2
WP4	Equipment and ICT enablers for First Aid Responses	6	4
WP5	Common Practices, and operational procedures for First Aid Responses	6	2
WP6	Cooperation, Education and Training for First Aid Responses	3	4
WP7	Reference Integration, Evaluation and Demonstration	14	7

##### a) Actions performed:

FIIBAP is not going to perform major parts of the actions.

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
Does the participant envisage that part of its work is performed by linked third parties <sup>3</sup>	Y

<sup>3</sup> A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the [Model Grant Agreement](#)).

SERMAS and FIIBAP signed a general collaboration agreement that is the framework for the FIIBAP participation in the project VALKYRIES as legal third party of the main beneficiary SERMAS. Additionally, SERMAS only has a "budgetary account", which means that the European project's funds go directly to the account of the LTP FIIBAP, which is the entity responsible for the financial management of the project.

This participation mode of SERMAS with a regional Biomedical Foundation as LTP (Art. 14) has been a regular participation modality for the research groups of the Madrid regional hospitals since FP7. Examples of these projects (H2020) are: TENDER (GA 875325), INTREPID (GA 883345), FASTER (GA 875325)

SERMAS is the body responsible for both the management and provision of public health care services in the Madrid región, and the management and implementation of programs for disease prevention, health promotion and rehabilitation. FIIBAP as a public foundation that promotes the development of R&I projects involving public health system, will support and provide its knowledge and tools to achieve VALKYRIES objectives. To do so, FIIBAP will contribute to (T1.1) Governance and Technical/Scientific Management, particularly with the governance and technical management, (T1.4) Dissemination strategy involving FIIBAP's networking which is not only national, As the (WP2) Design Principles and harmonisation Tactics will provide the design, specifications and requirements to take into account by the rest of the project life cycle. FIIBAP will focus its contribution in (T2.1) Definition of System Requirements and Demonstration Use Cases (T2.4) Map of Standards and joint roadmap (T2.5) Harmonization framework and (T2.6) Harmonization and Standardization Reports. In addition, FIIBAP will provides its expertise at (T3.3) Data protection and IP boundaries to improve interoperability and deployment (T3.5) Sustainable commercialization and commercial deployment. Also, FIIBAP will contribute to (T4.4) The digitalization on first aid actuaciones (T4.5) Instrumentation and health support wearable devices base on previous experiences in technological projects. In (WP5) FIIBAP will support SERMAS with the development of (T5.1) Reconnaissance, triage and crisis responses planning, (T5.2) Maintenance, logistics and deployment. By taking advantage of its large national and international relations and networking, FIIBAP will develop tasks for cooperation, education and training in (WP6) (T6.1) Resource Federation and trusted information sharing (T6.2) Education and Training for first aid responses, (T6.4) Civil-Military Cooperation and (T6.5) Civil Protection and Aid Volunteerism. Finally, FIIBAP will place all its capacities to support and contribute to the development of (WP7) where SERMAS leads (T7.5) Demonstration #1 Spain-Portugal and support (T7.4) Evaluation and validation by preparing all the information and inputs collected during the Project implementation.

Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
Does the participant envisage that part of the work is performed by International Partners <sup>4</sup> (Article 14a of the General Model Grant Agreement)?	N

**No third parties involved for the rest of the partners.**

<sup>4</sup> 'International Partner' is any legal entity established in a non-associated third country which is not eligible for funding under Article 10 of the Rules for Participation Regulation No 1290/2013.

## 5. ETHICS AND SECURITY

### 5.1. Ethics

#### 5.1.1. Background ethic analysis in relation to the scientific program

The primary objective of the VALKYRIES project is to develop, implement, validate and apply innovative theoretical foundations, methods, prototypes and their demonstration on a reference integration for supporting the ongoing/planned European actions for pre-standardisation and harmonisation technologies, procedures, preparedness and cross-sector/border cooperation for first aid response at disaster management by emergency health services, with the focus on their vehicular deployments. For the set harmonisation purposes, the project will consider the current and detected issues concerning ethics, regulation, certification, accreditation, agreements of conformity criteria, and all the standardisation stages. The resulting discoveries, methodologies, strategies, and support to harmonisation tactics/tools shall be enforced and demonstrated on a reference integrated *platform* driven by real needs focused on closing the disruption gap. The challenges in the scope of the demonstration will be prioritised by the partner end-users and practitioners supported by the VALKYRIES' panels of external experts and stakeholders, assuming as preliminarily inputs the results of precedent National and European level related studies.

It must also be noted that, for answering the much needed coordination of civil and military cooperation in responding to mass disasters with a large number of victims, and for taking into account the different normative and ethical landscape among participating countries with reference to the role of military services in such mass disasters instances, Valkyries involves partners with expertise or relationships in the military domain (INDRA, BDI, UMU, PARTICLE, ISEMI) and has received the support from military related institutions.

Nevertheless, both envisaged standardization protocols and technological developments target exclusive civil use. In addition, appropriate safeguards to minimize any (*albeit very low*) risk of misuse of research data/results will be put in place.

Evaluation and demonstration of the interoperability and enhancements derived from harmonising vehicular first aid related enablers at four cross-border and cross-sectorial scenarios will entail some forms of human participations from members of the consortium.

Valkyries' research and innovation takes into account the increasing presence of automatisms (AI-drivers, Natural Language Processing, Speech Recognition, Computer Vision), these semantical, communication and operational decisions shall be in compliance to capabilities for processing this information without human intervention and need to be fully aligned with the EU ethical and legal framework. Valkyries will promote a human centric approach to automation and AI in a privacy by design and by default environment.

Also, research and innovation envisaged (especially in developing instrumentation and health support wearable devices) might require the processing of personal data to develop privacy preserving approaches. Valkyries plans to use synthetic personal data. Yet, for further security and to ensure full GDPR compliance, it will establish a protocol for anonymizing any original personal data before they are eventually shared by any of the partners in the consortium.

The observe-orient-decide-act (OODA) approach of Valkyries requires a constant involvement of stakeholders both as partners in the consortium and as participants in the EAB. In these instances and in the envisaged training and workshops for first aid responders and other stakeholders (minimal and administrative needed) personal data will be processed fully abiding to the minimization principle and, in general, to the prescriptions of the GDPR and national laws where applicable.

In Valkyries research and innovation actions paves the way to standardize also data gathering and sharing from geographically very different European countries, and validate the outcomes of these analyses in terms of patient risk profiles, personalised management strategies through prospective use cases complemented by decision support based on real world data. For instance, to answer to Challenge 7 (Streamlining the pan-European capacitation for patient-management at first aid responses in mass casualty disaster scenarios) experiments will be required using personal data to respond to the needs for standards on patient-management in mass casualty incidents (e.g. minimal data-set for patient-management, management of data of affected persons in mass casualties, which shall duly take into account privacy issues and personal data equipment, etc.), or to close the gap in (inter)national pre-hospital patient-management with differing national standards (e.g. standardized electronic triage system to improve the logistics and the situation awareness). Albeit Valkyries plan to use as much as possible synthetic data, the use of real-world personal

data cannot be fully ruled out. However, any ethics issue that might arise is addressed by the envisaged safeguards.

Thus, as anticipated, these mentioned activities might entail human participation and personal data processing ethics issues that are addressed fully in this section and within Valkyries' research and innovation lifecycle. The consortium has already performed a preliminary ethics analysis related to its main research and innovation aims. More in details the following highly innovative goals needed our ethics attention since the design of the project. Moreover, the interconnection between our research outputs for a much-needed pathway for a trustworthy AI, mindful of its legal and ethical constraints, unfolds also in a continuous ethics monitoring and assurance plan described in section 5.1.5.

Valkyries moves from the assumption that the integration of different datasets is as a precondition for the advancement of coordination in European actions for pre-standardisation and harmonisation technologies, procedures, preparedness and cross-sector/border cooperation for first aid response at disaster management by emergency health services. **Against this backdrop, sustainability standards for the sharing of (sensitive) data as health data in the context of mass disasters will be defined, with specific regards to the protection of involved subjects' fundamental rights.** These sustainability standards will be defined on the basis of a balancing test, which identifies the regulatory level that maximises innovation, research and data subjects' protection for each of the applicable access regimes. **Our paramount goal is to promote Open Science in a privacy safe environment.**

From a regulatory and standardization perspective, the compliance activity relies on the analysis of the complex legal-ethical framework from a comparative perspective to identify possible practical gaps to be harmonized and re-interpreted in terms of contractual conditions between different stakeholders. For instance, it must be noted that the application of privacy policy may differ in behaviour according to local configuration and conditions in mass disasters involving cross borders and cross sectoral scenarios. This means that different privacy policy is applied according to contextual information such as the country of origin of the query or the identity of the querying user when the local node has been so instructed.

This innovative legal and architectural approach allows harnessing the most from diversified data pools with the highest possible privacy preserving approach related also to local legal and policy rules.

### 5.1.2. Ethics Issue table

<b>1. HUMAN EMBRYOS/FOETUSES</b>	<b>No</b>
Does your research involve Human Embryonic Stem Cells (hESCs)?	No
Does your research involve the use of human embryos?	No
Does your research involve the use of human foetal tissues / cells?	No
<b>2. HUMANS</b>	
Does your research involve human participants?	Yes
Are they volunteers for social or human sciences research?	No
Are they persons unable to give informed consent?	No
Are they vulnerable individuals or groups?	No
Are they children/minors?	No
Are they patients?	No
Are they healthy volunteers for medical studies?	No
Does your research involve physical interventions on the study participants?	No
<b>3. HUMAN CELLS / TISSUES</b>	



Does your research involve human cells or tissues (other than from Human Embryos/Foetuses, i.e. section 1)?	No
<b>4. PERSONAL DATA</b>	
Does your research involve personal data collection and/or processing?	Yes
Does it involve the collection and/or processing of sensitive personal data (e.g: health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?	No (extended use of synthetic data and anonymization protocols)
Does it involve processing of genetic information?	NO
Does it involve tracking or observation of participants?	NO
Does your research involve further processing of previously collected personal data (secondary use)?	Yes (possibly)
<b>5. ANIMALS</b>	
Does your research involve animals?	No
<b>6. THIRD COUNTRIES</b>	
In case non-EU countries are involved, do the research related activities undertaken in these countries raise potential ethics issues?	No
<p><b>A Norwegian partner is involved (USN) and potentially personal data could be transferred from/to Norway. However, although not a member of the EU, Norway is a member of the European Economic Area (EEA). The GDPR was incorporated into the EEA agreement and became applicable in Norway on 20 July 2018. Norway is thus bound by the GDPR in the same manner as EU Member States.</b></p>	
Do you plan to use local resources (e.g. animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna, or flora samples, etc.)?	No
Do you plan to import any material - including personal data - from non-EU countries into the EU?	No
<p><b>Although the envisaged architecture for personal data flows aims at minimizing the circulation of personal data and no personal data as such are envisaged to be imported from Norway to the EU, in case any personal data transfer should reveal necessary appropriate safeguards will be adopted taking into account also that the GDPR was incorporated into the EEA agreement and became applicable in Norway on 20 July 2018.</b></p>	
Do you plan to export any material - including personal data - from the EU to non-EU countries?	No
In case your research involves low and/or lower middle-income countries, are any benefits-sharing actions planned?	No
Could the situation in the country put the individuals taking part in the research at risk?	No



<b>7. ENVIRONMENT &amp; HEALTH and SAFETY</b>	
Does your research involve the use of elements that may cause harm to the environment, to animals or plants?	No
Does your research deal with endangered fauna and/or flora and/or protected areas?	No
Does your research involve the use of elements that may cause harm to humans, including research staff?	No
<b>8. DUAL USE</b>	
Does your research involve dual-use items in the sense of Regulation 428/2009, or other items for which an authorisation is required?	No
<b>9. EXCLUSIVE FOCUS ON CIVIL APPLICATIONS</b>	
Could your research raise concerns regarding the exclusive focus on civil applications?	No
<b>10. MISUSE</b>	
Does your research have the potential for misuse of research results?	No
<b>11. OTHER ETHICS ISSUES</b>	
Are there any other ethics issues that should be taken into consideration? Please specify	No

**The above analysis with the technical highlighted safeguard and architectural approaches in addition to the following specifications provide the utmost level of ethics attention the Valkyries consortium is aiming at.**

Overall, the consortium refers to the risk-based approach as a general strategy to continuously monitoring the ethical issues in all the undertaken activities as described under 5.15. The project has embraced an ethics and legality by design approach.

Partners are particularly sensitive on the topic and will address their skills and expertise in the field facing the challenge to promote inclusivity, fairness, non-discrimination, human dignity from the Consortium multidisciplinary perspective during the whole project lifecycle.

### 5.1.3. Humans

Valkyries will involve research volunteers from the partners in the simulation of use case.

The consortium partners are familiar with the ethical challenges associated with research involving humans, given their training and previous experience in research methodology. They are familiar with the processes needed to meet and exceed these requirements when conducting the research activities. In particular, SSSA—who will manage the project’s ethical research monitoring as well — is experienced and trained in research ethics, ethical and societal impact assessment, gender issues, and data protection aspects.

No individual unable to consent will be enrolled at any moment. In case of need, all necessary forms will be –overtime- attached to the DMP, interpreted as a living document once approved by the Valkyries Ethics Committee.

Any copy of the opinions, notifications or authorizations eventually required will be obtained and kept on file and be submitted upon request.

The Consortium is equipped to comply with along all national legal and ethical applicable standards and has already envisaged appropriate measures to minimize risks. To this end, SSSA will support the researcher to conduct proper ethical-legal assessment in order to ensure that the research will be conducted in line with the European Charter of Fundamental Rights, the European Convention on Human Rights and its Supplementary Protocols, the European Charter for Researchers, national legislations, and Regulation (EU)

2016/679.

Due attention and harmonization will be devoted particularly with regard to obtaining, whenever necessary, informed consent and to guaranteeing anonymity and confidentiality.

Please note that no actual personal data transfer is envisaged to date, but appropriate safeguards are already envisaged in case of need.

With reference to data protection a statement by the PI's DPO will be obtained as well. In particular, INDRA has appointed both a Data Protection Officer (whose email address will be made available in all relevant forms and on the web site of the project), currently in the research team of the Applicant and along with e-mail contact of the Valkyries Ethics Manager.

#### **5.1.4. Personal Data**

As described in the background analysis Valkyries will adopt a privacy by design and by default approach throughout its entire lifecycle based on a close adherence to the minimization principle.

Further processing of personal data is possible especially in the development of the use cases and of the innovative technologies. In cases in which it will prove impossible to proceed with anonymized/pseudonymized data pursuant to art. 89 GDPR, the Consortium will ascertain for each dataset to have a lawful basis for the data processing and that the appropriate technical and organisational measures are in place to safeguard the rights of the data subjects. This applies also to data used in the project that is publicly available and can be freely used for its purposes in order to ensure, as well, adherence to the purpose limitation principle.

Valkyries will also use state-of-the-art technologies for secure storage, delivery, and access of personal information, as well as managing the rights of the users. In this way, it is assured that the accessed, delivered, stored, and transmitted content will be managed by the right persons, with well-defined rights, at the right time. A more detailed description of the technical and organisational measures that will be implemented to safeguard the rights and freedoms of the data subjects/research participants along with a description of the security measures that will be implemented to prevent unauthorised access to personal data or the equipment used for processing will be included in the DMP.

Moreover, the project will pay due attention to the procedures and/or systems implemented for data collection, storage, protection, retention, and destruction, ensuring that they comply with national and EU legislation on the subject.

The DMP will also contain, since its first version, detailed information on the informed consent procedures also with regard to personal data processing to the extent needed.

The consortium will evaluate the ethics risks related to the data processing activities of the project redacting an opinion if a data protection impact assessment should be conducted under art. 35 General Data Protection Regulation 2016/679. Thus, a Data Protection Impact Assessment (DPIA) will be conducted, if necessary, under Article 35 of the General data Protection Regulation 2016/679 and a policy on incidental findings will be elaborated if needed as part of a more general ethical assessment.

From a regulatory and standardization perspective, the compliance activity relies on the analysis of the complex legal-ethical framework from a comparative perspective to identify possible practical gaps to be harmonized and re-interpreted in terms of contractual conditions between different stakeholders.

For these purposes, specific attention will be given to the legal framework of access regimes regarding data concerning health. Regulatory responses, such as the one given by the recently enacted Open Data Directive (Dir. EU 2019/1024), place particular emphasis on the value of access and transferability of research data, in consistency with the paradigm of open science and innovation, aiming at fostering the interaction between research results and market innovation.

Valkyries moves from the assumption that the integration of different datasets is as a precondition for the advancement of the needed standardizations in the addressed areas/sectors. Against this backdrop, sustainability standards for the sharing of sensitive data as health data in the context of medical research will be defined, with specific regards to the protection of involved subjects' fundamental rights. These sustainability standards will be defined on the basis of a balancing test, which identifies the regulatory level that maximises innovation, research and data subjects' protection for each of the applicable access regimes. Our paramount goal is to promote Open Science in a privacy safe environment.

In this respect, if needed, templates for informed consent will be prepared (in language and terms intelligible to the participants) in the beginning of the project as part of WP1. The information sheet given will offer a clear statement of all aspects that are relevant for their decision about whether or not to agree to participation. As a general basis, all participants will be informed about the following:

- Description of the project, objectives and methodology including the list of beneficiaries and funding scheme.
- Objective of the interview or the study.
- Possible risks / incidental findings procedures
- Description on how the informant input will be used in the project.
- Procedures already in place (such as data anonymization/pseudonymisation, encryption of data content and safe servers that apply authorization to manage access to data repository) for ensuring data protection, confidentiality, and privacy.

### **5.1.5. Data management procedures**

The investigators involved in Valkyries from research institutions eventually processing personal (sensitive) data will be the data controllers of the data they process within their institutions. With the support of Valkyries consortium, they will implement the appropriate technical and organisational measures to ensure and be able to demonstrate that the personal data are processed in accordance with the data protection rules). Furthermore, Valkyries will encourage and support a strong privacy policy for partners which storage health data (sensitive data). In the same vein, a strong data security policy and data governance policy will be reviewed for these partners with checks, auditing and monitoring throughout the project's duration and eventually the conducting of a Data Protection Impact Assessment (DPIA) under art. 35 of the General Data Protection Regulation 2016/679.

The lack of interoperability standards both regarding employed data and the processing technology affects all the three stages of Valkyries researched technologies' development, that is the research, development, and deployment stage. In respect to data sharing, interoperability means not only technical but also legal interoperability.

Apart from technically interoperability- which structurally enables communication between differently controlled systems-, legal interoperability primarily relates to license interoperability, that is the possibility of legally mixing data coming from different sources and using them within a broad range of projects and business models. In a nutshell, if technical interoperability enables the sharing of data in a machine-readable format, legal interoperability relates to the licenses that allow the re-use of data and related processing technology. Legal interoperability is a particularly relevant topic in the context of medical research, where research datasets are most of the times encumbered with an array of different intellectual property rights. In this perspective, legal interoperability ultimately relates to the coordination of different right-holders.

Licenses of data are a particularly complex issue, increasingly debated at policy level. According to the EU Commission, any regulatory enquiry in this controversial issue needs to move from the principle "as open as possible, as closed as necessary", which has been highlighted by the Commission as guiding principle of the new data strategy, promoting data re-usability and analysis across different sectors of the economy.

Against this backdrop, Valkyries will enquire the design of such licenses, questioning the suitability of FRAND terms to the licensing of data and which type of licenses (e.g. FLOSS; license granted also for commercial or only non-commercial uses) would be desirable to use in the context of medical research and will integrate the outcomes of such analysis in its ethics and data management protocol.

### **5.1.6. Ethics management issues**

As outlined task 1.5 will ensure the Valkyries's ethical and legal compliance framework, among else developing the needed guidelines and protocols.

It will produce in close connection with all partners, the External Advisory Boards general protocols specifically tailored and tested for the reenvisaged research and innovation tasks, managing identified regulatory gaps, overlaps and synergies in the specific field.

Along these lines, Valkyries develops a taxonomy of different types of data and highlights for each of the identified categories the risks raised for the CCC's management, in terms of data quality, accuracy, security. Accordingly, Valkyries (T.1.5) will assess the applicable data sharing regimes for the integration of the

different employed datasets, distinguishing between public health datasets, privately held health datasets and mixed public-private health datasets.

Valkyries aims at ensuring pathways to reconcile the data protection framework with the identified access regimes.

To this end Valkyries ethics management will ensure the transparency requirements of the developed integrated research model especially with reference to the ability to explain the tools developed and analyses the process of translating and using research findings in the most appropriate way.

Leaders of all relevant work packages will include in their work flows the processes needed to make their project solutions and activities compliant with existing EU and national legislations and H2020 ethical guidelines, as described by Valkyries overall Ethical strategy.

The envisaged strategy unfolds in four main lines, namely: 1) addressing human participation; 2) directly tackling data protection issues; 3) addressing gender related issues; and 4) designing a general strategy for continuous ethical monitoring.

One of the first tasks of the ethics strategy will be to check if special derogations pertaining to the rights of data subjects or the processing of genetic, biometric and/or health data have been established under the national legislation of the participating countries where Valkyries research takes place in order to ensure compliance with the respective national legal framework(s).

Also, a devoted **Ethics Committee will be established** as part of WP1. Among else it will comprise data privacy and human participation experts from INDRA, NOVOTEC, HESE, SSSA, as well as from the first responder's partners. The Committee shall also appoint a dedicated Ethics Manager to oversee the ethical concerns of the project and ensure its ongoing security. Their role will be detailed in the CA. Close interaction with external advisors from the External Advisory Board shall help a co-creative adoption process for all the guidelines and templates needed to ensure continuous compliance with the EC regulations and national rules and practices.

### 5.1.7. Dual use and exclusive focus on civil applications

As noted, Valkyries involves partners with expertise or relationships in the military domain (INDRA, BDI, UMU, EDGE, ISEMI) and has received the support from military related institutions. Their participation is strategic to answer the much-needed coordination of civil and military cooperation in responding to mass disasters with a large number of victims, and for considering the different normative and ethical landscape among participating countries. However, the project remains with an exclusive focus on civil applications and these partners/stakeholder's participation is limited to these aims.

No dual-use items in the sense of Regulation (EC) 428/2009 is used in Valkyries. However, in case the ethics monitoring will flag any even minimal risk and appropriate risk-mitigation strategies will be defined and kept on file.

Although, the preliminary ethics analysis has revealed no risk, the continuous ethics monitoring envisaged during the project lifecycle will ensure appropriate safeguards to guarantee the exclusive focus on civil applications.

Details on potential dual use implications of the project and risk-mitigation strategies must be submitted as a deliverable on the month 9. This deliverable will include risk mitigation strategies to mitigate the potential risks of a Dual use.

## 6. Security

The activities performed in Valkyries have no security impact and raise no public security issues for Europe and public security or national security issues in the countries of the partners participating in the project.

Valkyries activities do not involve "EU-classified information" as background or results

6. Security<sup>5</sup>

- Activities or results raising security issues: (YES/NO): NO
- 'Classified information' as background (i.e. use of already classified documents/information at EU or national level) and/or results (i.e. production of documents/information that need to be EU classified): (YES/NO):NO

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<sup>5</sup> **Article 37.1 of the Model Grant Agreement:** *Before disclosing results of activities raising security issues to a third party (including affiliated entities), a beneficiary must inform the coordinator — which must request written approval from the Commission/Agency. **Article 37.2:** Activities related to 'classified deliverables must comply with the 'security requirements' until they are declassified. Action tasks related to classified deliverables may not be subcontracted without prior explicit written approval from the Commission/Agency. The beneficiaries must inform the coordinator — which must immediately inform the Commission/Agency — of any changes in the security context and — if necessary — request for Annex 1 to be amended (see Article 55)*



## 7. ANNEXES

### 7.1. ANNEX I. References

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## **7.2. ANNEX II: Letters of Support**

ESTIMATED BUDGET FOR THE ACTION

	Estimated eligible <sup>1</sup> costs (per budget category)										EU contribution			Additional information		
	A. Direct personnel costs				B. Direct costs of subcontracting	[C. Direct costs of fin. support]	D. Other direct costs		E. Indirect costs <sup>2</sup>	Total costs	Reimbursement rate %	Maximum EU contribution <sup>3</sup>	Maximum grant amount <sup>4</sup>	Information for indirect costs	Information for auditors	Other information:
	A.1 Employees (or equivalent)		A.4 SME owners without salary				D.1 Travel	D.5 Costs of internally invoiced goods and services						Estimated costs of in-kind contributions not used on premises	Declaration of costs under Point D.4	Estimated costs of beneficiaries/ linked third parties not receiving funding/ international partners
A.2 Natural persons under direct contract		A.5 Beneficiaries that are natural persons without salary		D.2 Equipment												
A.3 Seconded persons				D.3 Other goods and services												
[A.6 Personnel for providing access to research infrastructure]				[D.4 Costs of large research infrastructure]												
Form of costs <sup>6</sup>	Actual	Unit <sup>7</sup>	Unit <sup>8</sup>				Actual									
	a	Total b	No hours	Total c	d	[e]	f	Total g	h = 0,25 x (a +b+c+f+g +[i1] <sup>13</sup> + [i2] <sup>13</sup> -n)	j = a+b+c+d +[e]/+f+g+h +[i1]/+ [i2]	k	l	m	n	Yes/No	
1. INDRA	333 900.00	0.00	0.00	0.00	0.00	0.00	32 000.00	0.00	91 475.00	457 375.00	70.00	320 162.50	320 162.50	0.00	No	n/a
- IFT	275 600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	68 900.00	344 500.00	70.00	241 150.00	241 150.00	0.00	No	n/a
Total beneficiary	609 500.00	0.00			0.00	0.00	32 000.00	0.00	160 375.00	801 875.00		561 312.50	561 312.50	n/a	n/a	0.00
2. SERMAS	160 000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40 000.00	200 000.00	100.00	200 000.00	200 000.00	0.00	No	n/a
- FIIBAP	150 000.00	0.00	0.00	0.00	0.00	0.00	20 000.00	0.00	42 500.00	212 500.00	100.00	212 500.00	212 500.00	0.00	No	n/a
Total beneficiary	310 000.00	0.00			0.00	0.00	20 000.00	0.00	82 500.00	412 500.00		412 500.00	412 500.00	n/a	n/a	0.00
3. TASSICA SA	362 500.00	0.00	0.00	0.00	0.00	0.00	36 000.00	0.00	99 625.00	498 125.00	70.00	348 687.50	348 687.50	0.00	No	n/a
4. ISEMI	192 720.00	0.00	0.00	0.00	0.00	0.00	24 000.00	0.00	54 180.00	270 900.00	100.00	270 900.00	270 900.00	0.00	No	n/a
5. UMU	315 000.00	0.00	0.00	0.00	0.00	0.00	24 000.00	0.00	84 750.00	423 750.00	100.00	423 750.00	423 750.00	0.00	No	n/a
6. SSS	312 620.00	0.00	0.00	0.00	0.00	0.00	21 000.00	0.00	83 405.00	417 025.00	100.00	417 025.00	417 025.00	0.00	No	n/a
7. BC2050	320 000.00	0.00	0.00	0.00	0.00	0.00	32 000.00	0.00	88 000.00	440 000.00	70.00	308 000.00	308 000.00	0.00	No	n/a
8. BDI	330 000.00	0.00	0.00	0.00	0.00	0.00	35 000.00	0.00	91 250.00	456 250.00	100.00	456 250.00	456 250.00	0.00	No	n/a
9. BRC	75 200.00	0.00	0.00	0.00	0.00	0.00	11 000.00	0.00	21 550.00	107 750.00	100.00	107 750.00	107 750.00	0.00	No	n/a
10. KEMEA	280 500.00	0.00	0.00	0.00	0.00	0.00	35 000.00	0.00	78 875.00	394 375.00	100.00	394 375.00	394 375.00	0.00	No	n/a
11. HESE	240 000.00	0.00	0.00	0.00	0.00	0.00	20 800.00	0.00	65 200.00	326 000.00	100.00	326 000.00	326 000.00	0.00	No	n/a
12. ARATOS.NET	246 050.00	0.00	0.00	0.00	0.00	0.00	32 000.00	0.00	69 512.50	347 562.50	70.00	243 293.75	243 293.75	0.00	No	n/a
13. USN	369 271.00	0.00	0.00	0.00	0.00	0.00	35 000.00	0.00	101 067.75	505 338.75	100.00	505 338.75	505 338.75	0.00	No	n/a
14. AREU	291 500.00	0.00	0.00	0.00	0.00	0.00	35 000.00	0.00	81 625.00	408 125.00	100.00	408 125.00	408 125.00	0.00	No	n/a
15. HRT	121 800.00	0.00	0.00	0.00	0.00	0.00	18 000.00	0.00	34 950.00	174 750.00	100.00	174 750.00	174 750.00	0.00	No	n/a
16. NOVOTEC	323 400.00	0.00	0.00	0.00	0.00	0.00	35 000.00	0.00	89 600.00	448 000.00	70.00	313 600.00	313 600.00	0.00	No	n/a
17. PARTICLE	341 600.00	0.00	0.00	0.00	0.00	0.00	28 800.00	0.00	92 600.00	463 000.00	70.00	324 100.00	324 100.00	0.00	No	n/a
Total consortium	5 041 661.00	0.00		0.00	0.00	0.00	474 600.00	0.00	1 379 065.25	6 895 326.25		5 995 757.50	5 995 757.50			0.00

<sup>1</sup> See Article 6 for the eligibility conditions.

<sup>2</sup> Indirect costs already covered by an operating grant (received under any EU or Euratom funding programme; see Article 6.5.(b)) are ineligible under the GA. Therefore, a beneficiary/linked third party that receives an operating grant during the action's duration cannot declare indirect costs for the year(s)/reporting period(s) covered by the operating grant, unless it can demonstrate that the operating grant does not cover any costs of the action (see Article 6.2.E).

<sup>3</sup> This is the theoretical amount of EU contribution that the system calculates automatically (by multiplying all the budgeted costs by the reimbursement rate). This theoretical amount is capped by the 'maximum grant amount' (that the Agency decided to grant for the action) (see Article 5.1).

<sup>4</sup> The 'maximum grant amount' is the maximum grant amount decided by the Agency. It normally corresponds to the requested grant, but may be lower.

<sup>5</sup> Depending on its type, this specific cost category will or will not cover indirect costs. Specific unit costs that include indirect costs are: costs for energy efficiency measures in buildings, access costs for providing trans-national access to research infrastructure and costs for clinical studies.

<sup>6</sup> See Article 5 for the forms of costs.

<sup>7</sup> Unit : hours worked on the action; costs per unit (hourly rate) : calculated according to the beneficiary's usual accounting practice.

<sup>8</sup> See Annex 2a 'Additional information on the estimated budget' for the details (costs per hour (hourly rate)).

<sup>9</sup> Unit and costs per unit : calculated according to the beneficiary's usual accounting practices.

<sup>10</sup> Flat rate : 25% of eligible direct costs, from which are excluded: direct costs of subcontracting, costs of in-kind contributions not used on premises, direct costs of financial support, and unit costs declared under budget category F if they include indirect costs (see Article 6.2.E).

<sup>11</sup> See Annex 2a 'Additional information on the estimated budget' for the details (units, costs per unit).

<sup>12</sup> See Annex 2a 'Additional information on the estimated budget' for the details (units, costs per unit, estimated number of units, etc).

<sup>13</sup> Only specific unit costs that do not include indirect costs.

ESTIMATED BUDGET FOR THE ACTION

<sup>14</sup> See Article 9 for beneficiaries not receiving funding.

<sup>15</sup> Only for linked third parties that receive funding.

## ANNEX 2a

### ADDITIONAL INFORMATION ON THE ESTIMATED BUDGET

- Instructions and footnotes in blue will not appear in the text generated by the IT system (since they are internal instructions only).
- For options [in square brackets]: the applicable option will be chosen by the IT system. Options not chosen will automatically not appear.
- For fields in [grey in square brackets] (even if they are part of an option as specified in the previous item): IT system will enter the appropriate data.

**⚠ Transitory period:** Until SyGMA fully supports Annex 2a, you must prepare it manually (using this template by choosing and deleting the options/entering the appropriate data).  
For the 'unit cost tables': either fill them out manually or use currently existing tables from Annex 1 or the proposal.  
The document can then be uploaded in SyGMA and attached to the grant agreement.

#### Unit cost for SME owners/natural beneficiaries without salary

##### **1. Costs for a [SME owner]/[beneficiary that is a natural person] not receiving a salary**

Units: hours worked on the action

Amount per unit ('hourly rate'): calculated according to the following formula:

{the monthly living allowance for researchers in MSCA-IF actions / 143 hours}  
multiplied by  
{country-specific correction coefficient of the country where the beneficiary is established}

The monthly living allowance and the country-specific correction coefficients are set out in the Work Programme (section 3 MSCA) in force at the time of the call:

- for calls *before* Work Programme 2018-2020:
  - for the monthly living allowance: **EUR 4 650**
  - for the country-specific correction coefficients: see Work Programme 2014-2015 and Work Programme 2016-2017 (available on the [Participant Portal Reference Documents](#) page)
- for calls *under* Work Programme 2018-2020:
  - for the monthly living allowance: **EUR 4 880**
  - for the country-specific correction coefficients: see Work Programme 2018-2020 (available on the [Participant Portal Reference Documents](#) page)

**[additional OPTION for beneficiaries/linked third parties that have opted to use the unit cost (in the proposal/with an amendment):** For the following beneficiaries/linked third parties, the amounts per unit (hourly rate) are fixed as follows:

- beneficiary/linked third party [short name]: EUR [insert amount]
  - beneficiary/linked third party [short name]: EUR [insert amount]
- [same for other beneficiaries/linked third parties, if necessary] ]

Estimated number of units: see Annex 2

## **Energy efficiency measures unit cost**

### **2. Costs for energy efficiency measures in buildings**

Unit: m<sup>2</sup> of eligible ‘conditioned’ (i.e. built or refurbished) floor area

Amount per unit\*: see (for each beneficiary/linked third party and BEST table) the ‘unit cost table’ attached

\* Amount calculated as follows:  
{EUR 0.1 x estimated total kWh saved per m<sup>2</sup> per year x 10}

Estimated number of units: see (for each beneficiary/linked third party and BEST table) the ‘unit cost table’ attached

Unit cost table (energy efficiency measures unit cost)<sup>1</sup>

Short name beneficiary/linked third party	BEST No	Amount per unit	Estimated No of units	Total unit cost (cost per unit x estimated no of units)

---

<sup>1</sup> Data from the ‘building energy specification table (BEST)’ that is part of the proposal and Annex 1.

## **Research infrastructure unit cost**

### **3. Access costs for providing trans-national access to research infrastructure**

Units<sup>2</sup>: see (for each access provider and installation) the ‘unit cost table’ attached

Amount per unit<sup>\*</sup>: see (for each access provider and installation) the ‘unit cost table’ attached

\* Amount calculated as follows:

$$\frac{\text{average annual total access cost to the installation (over past two years}^3\text{)}}{\text{average annual total quantity of access to the installation (over past two years}^4\text{)}}$$

Estimated number of units: see (for each access provider and installation) the ‘unit cost table’ attached

Unit cost table (access to research infrastructure unit cost)<sup>5</sup>

Short name access provider	Short name infrastru cture	Installation		Unit of access	Amount per unit	Estimated No of units	Total unit cost (cost per unit x estimated no of units)
		No	Short name				

## **Clinical studies unit cost**

### **4. Costs for clinical studies**

Units: patients/subjects that participate in the clinical study

Amount per unit<sup>\*</sup>: see (for each sequence (if any), clinical study and beneficiary/linked third party) the ‘unit cost table’ attached

\* Amount calculated, for the cost components of each task, as follows:

For **personnel costs**:

For personnel costs of doctors: ‘average hourly cost for doctors’, i.e.:

{certified or auditable total personnel costs for doctors for year N-1

{ 1720 \* number of full-time-equivalent for doctors for year N-1 }

multiplied by

estimated number of hours to be worked by doctors for the task (per participant)}

For personnel costs of other medical personnel: ‘average hourly cost for other medical personnel’, i.e.:

{certified or auditable total personnel costs for other medical personnel for year N-1

{ 1720 \* number of full-time-equivalent for other medical personnel for year N-1 }

<sup>2</sup> Unit of access (e.g. beam hours, weeks of access, sample analysis) fixed by the access provider in proposal.

<sup>3</sup> In exceptional and duly justified cases, the Commission/Agency may agree to a different reference period.

<sup>4</sup> In exceptional and duly justified cases, the Commission/Agency may agree to a different reference period.

<sup>5</sup> Data from the ‘table on estimated costs/quantity of access to be provided’ that is part of the proposal and Annex 1.



**H2020 Templates: Annex 2a (Additional information on the estimated budget)**

multiplied by  
estimated number of hours to be worked by other medical personnel for the task (per participant)}

For personnel costs of technical personnel: 'average hourly cost for technical personnel', i.e.:

$$\frac{\{\text{certified or auditable total personnel costs for technical personnel for year N-1}\}}{\{1720 * \text{number of full-time-equivalent for technical personnel for year N-1}\}}$$

multiplied by  
estimated number of hours to be worked by technical personnel for the task (per participant)}

'total personnel costs' means actual salaries + actual social security contributions + actual taxes and other costs included in the remuneration, provided they arise from national law or the employment contract/equivalent appointing act

For **consumables**:

For each cost item: 'average price of the consumable', i.e.:

$$\frac{\{\{\text{certified or auditable total costs of purchase of the consumable in year N-1}\}}{\text{total number of items purchased in year N-1}\}}$$

multiplied by  
estimated number of items to be used for the task (per participant)}

'total costs of purchase of the consumable' means total value of the supply contracts (including related duties, taxes and charges such as non-deductible VAT) concluded by the beneficiary for the consumable delivered in year N-1, provided the contracts were awarded according to the principle of best value- for-money and without any conflict of interests

For **medical equipment**:

For each cost item: 'average cost of depreciation and directly related services per unit of use', i.e.:

$$\frac{\{\{\text{certified or auditable total depreciation costs in year N-1} + \text{certified or auditable total costs of purchase of services in year N-1 for the category of equipment concerned}\}}{\text{total capacity in year N-1}}$$

multiplied by  
estimated number of units of use of the equipment for the task (per participant)}

'total depreciation costs' means total depreciation allowances as recorded in the beneficiary's accounts of year N-1 for the category of equipment concerned, provided the equipment was purchased according to the principle of best value for money and without any conflict of interests + total costs of renting or leasing contracts (including related duties, taxes and charges such as non-deductible VAT) in year N-1 for the category of equipment concerned, provided they do not exceed the depreciation costs of similar equipment and do not include finance fees

For **services**:

For each cost item: 'average cost of the service per study participant', i.e.:

$$\frac{\{\text{certified or auditable total costs of purchase of the service in year N-1}\}}{\text{total number of patients or subjects included in the clinical studies for which the service was delivered in year N-1}\}}$$

'total costs of purchase of the service' means total value of the contracts concluded by the beneficiary (including related duties, taxes and charges such as non-deductible VAT) for the specific service delivered in year N-1 for the conduct of clinical studies, provided the contracts were awarded according to the principle of best value for money and without any conflict of interests

For **indirect costs**:

$$\{\{\{\text{cost component 'personnel costs'} + \text{cost component 'consumables'} + \text{cost component 'medical equipment'}\}\}$$

minus

$$\{\text{costs of in-kind contributions provided by third parties which are not used on the beneficiary's premises} + \text{costs of providing financial support to third parties (if any)}\}\}$$

multiplied by

$$25\% \}$$

**H2020 Templates: Annex 2a (Additional information on the estimated budget)**

The estimation of the resources to be used must be done on the basis of the study protocol and must be the same for all beneficiaries/linked third parties/third parties involved.

The year N-1 to be used is the last closed financial year at the time of submission of the grant application.

Estimated number of units: see (for each clinical study and beneficiary/linked third party) the 'unit cost table' attached

Unit cost table: clinical studies unit cost<sup>6</sup>

Task, Direct cost categories	Resource per patient	Costs year N-1 Beneficiary 1 [short name]	Costs year N-1 Linked third party 1a [short name]	Costs year N-1 Beneficiary 2 [short name]	Costs year N-1 Linked third party 2a [short name]	Costs year N-1 Third party giving in-kind contributions 1 [short name]
<b>Sequence No. 1</b>						
<b>Task No. 1</b> Blood sample						
(a) <b>Personnel costs:</b> - Doctors	n/a					
- Other Medical Personnel	Phlebotomy (nurse), 10 minutes	8,33 EUR	11,59 EUR	10,30 EUR	11,00 EUR	9,49 EUR
- Technical Personnel	Sample Processing (lab technician), 15 minutes	9,51 EUR	15,68 EUR	14,60 EUR	15,23 EUR	10,78 EUR
(b) <b>Costs of consumables:</b>	Syringe	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	Cannula	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	Blood container	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(c) <b>Costs of medical equipment:</b>	Use of -80° deep freezer, 60 days	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	Use of centrifuge, 15 minutes	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(d) <b>Costs of services</b>	Cleaning of XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(e) <b>Indirect costs (25% flat-rate)</b>		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
<b>Task No. 2</b>						
...						
<b>Amount per unit (unit cost sequence 1):</b>		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
<b>Sequence No. 2</b>						
<b>Task No. 1</b>						

<sup>6</sup> Same table as in proposal and Annex 1.

## H2020 Templates: Annex 2a (Additional information on the estimated budget)

XXX						
(a) <b>Personnel costs:</b>						
- Doctors	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
- Other Medical Personnel	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
- Technical Personnel	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(b) <b>Costs of consumables:</b>	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(c) <b>Costs of medical equipment:</b>	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(d) <b>Costs of services</b>	XXX	XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
(e) <b>Indirect costs</b> (25% flat-rate)		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
<b>Task No. 2</b>						
...						
<b>Amount per unit (unit cost sequence 2):</b>		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR
...						
<b>Amount per unit (unit cost entire study):</b>		XX EUR	XX EUR	XX EUR	XX EUR	XX EUR

## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**SERVICIO MADRILENO DE SALUD (SERMAS)**, established in PLAZA CARLOS TRIAS BERTRAN 7, MADRID 28020, Spain, VAT number: ESQ2801221I, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary** No ('2')

**in Grant Agreement No** 101020676 ('the Agreement')

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**TASSICA EMERGENCY TRAINING & RESEARCH SA (TASSICA SA)**, established in CALLE JOSE ZORRILLA 132 1E, SEGOVIA 40002, Spain, VAT number: ESA40238560, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary** No ('3')

**in Grant Agreement No** 101020676 ('the Agreement')

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**ISEM-INSTITUT PRE MEDZINARODNU BEZPECNOST A KRIZOVE RIADENIE, NO (ISEMI)**, established in VYSOKOSKOLAKOV 41, ZILINA 010 08, Slovakia, VAT number: SK2024121704, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary No ('4')**

**in Grant Agreement No 101020676 ('the Agreement')**

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**UNIVERSIDAD DE MURCIA (UMU)**, established in AVENIDA TENIENTE FLORESTA S/N - EDIFICIO CONVALECENCIA, MURCIA 30003, Spain, VAT number: ESQ3018001B, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary** No ('5')

**in Grant Agreement No** 101020676 ('the Agreement')

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO S ANNA (SSS)**, established in PIAZZA MARTIRI DELLA LIBERTA 33, PISA 56127, Italy, VAT number: IT01118840501, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary No ('6')**

**in Grant Agreement No 101020676 ('the Agreement')**

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**BLOCKCHAIN2050 BV (BC2050)**, established in Stationsplein 45, Rotterdam 3013 AK, Netherlands, VAT number: NL858762870B01, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary** No ('7')

**in Grant Agreement No** 101020676 ('the Agreement')

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**INSTITUT PO OTBRANA (BDI)**, established in prof. Tsvetan Lazarov blvd. 2, Sofia 1574, Bulgaria, VAT number: BG129010036, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary** No ('8')

**in Grant Agreement No** 101020676 ('the Agreement')

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**BULGARIAN RED CROSS (BRC)**, established in 76 JAMES BOURCHIER BLVD, SOFIA 1407, Bulgaria, VAT number: BG000703415, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary** No ('9')

**in Grant Agreement No** 101020676 ('the Agreement')

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**KENTRO MELETON ASFALEIAS (KEMEA)**, established in P KANELLOPOULOU 4 ST, ATHINA 10177, Greece, VAT number: EL999333507, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary** No ('10')

**in Grant Agreement No** 101020676 ('the Agreement')

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**HOSPITAL DO ESPIRITO SANTO DE EVORA EPE (HESE)**, established in LARGO SENHOR DA POBREZA, EVORA 7000 811, Portugal, VAT number: PT508085888, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary** No ('11')

**in Grant Agreement No** 101020676 ('the Agreement')

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**ARATOS NTOT NET LTD (ARATOS.NET)**, established in ARTEMIDOS 36, PALAIO FALIRO 175 61, Greece, VAT number: EL999021604, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary** No ('12')

**in Grant Agreement No** 101020676 ('the Agreement')

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary



## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**UNIVERSITETET I SOROST-NORGE (USN)**, established in KJOLNES RING 56, PORSGRUNN 3918, Norway, VAT number: NO911770709MVA, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary** No ('13')

**in Grant Agreement No** 101020676 ('the Agreement')

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**Azienda Regionale Emergenza Urgenza (AREU)**, established in Via Alfredo Campanini 6, Milano 20124, Italy, VAT number: IT03128170135, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary** No ('14')

**in Grant Agreement No** 101020676 ('the Agreement')

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**ELLINIKI OMADA DIASOSIS SOMATEIO (HRT)**, established in EMM PAPA 5, THESSALONIKI 54 248, Greece, VAT number: EL090197790, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary** No ('15')

**in Grant Agreement No** 101020676 ('the Agreement')

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**NOVOTEC CONSULTORES SA (NOVOTEC)**, established in CALLE CAMPEZO 1 EDIFICIO 3 PARQUE EMPRESARIAL DE LAS MERCEDES, MADRID 28022, Spain, VAT number: ESA78068202, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary No ('16')**

**in Grant Agreement No 101020676 ('the Agreement')**

**between INDRA SISTEMAS SA and the Research Executive Agency (REA) ('the Agency')**, under the powers delegated by the European Commission ('the Commission'),

**for the action entitled 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'**.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

## ANNEX 3

### ACCESSION FORM FOR BENEFICIARIES

**PARTICLE SUMMARY (PARTICLE)**, established in RUA DA VENEZUELA N 29 14 E, LISBON 1500 618, Portugal, VAT number: PT514686154, ('the beneficiary'), represented for the purpose of signing this Accession Form by the undersigned,

**hereby agrees**

**to become beneficiary** No ('17')

**in Grant Agreement No** 101020676 ('the Agreement')

**between** INDRA SISTEMAS SA **and** the Research Executive Agency (REA) ('the Agency'), under the powers delegated by the European Commission ('the Commission'),

**for the action entitled** 'Harmonization and Pre-Standardization of Equipment, Training and Tactical Coordinated procedures for First Aid Vehicles deployment on European multi-victim Disasters (VALKYRIES)'.

**and mandates**

**the coordinator** to submit and sign in its name and on its behalf any **amendments** to the Agreement, in accordance with Article 55.

By signing this Accession Form, the beneficiary accepts the grant and agrees to implement it in accordance with the Agreement, with all the obligations and conditions it sets out.

SIGNATURE

For the beneficiary

FINANCIAL STATEMENT FOR *[BENEFICIARY [name]/ LINKED THIRD PARTY [name]]* FOR REPORTING PERIOD *[reporting period]*

	Eligible <sup>1</sup> costs (per budget category)													Receipts	EU contribution			Additional information		
	A. Direct personnel costs			B. Direct costs of subcontracting	[C. Direct costs of fin. support]	D. Other direct costs			E. Indirect costs <sup>2</sup>	[F. Costs of ... ]			Total costs	Receipts	Reimbursement rate %	Maximum EU contribution <sup>3</sup>	Requested EU contribution	Information for indirect costs :		
	A.1 Employees (or equivalent)		A.4 SME owners without salary		[C.1 Financial support]	D.1 Travel	[D.4 Costs of large research infrastructure]	D.5 Costs of internally invoiced goods and services		[F.1 Costs of ...]			Receipts of the action, to be reported in the last reporting period, according to Article 5.3.3					Costs of in-kind contributions not used on premises		
	A.2 Natural persons under direct contract		A.5 Beneficiaries that are natural persons without salary		[C.2 Prizes]	D.2 Equipment		D.3 Other goods and services												
A.3 Seconded persons																				
Form of costs <sup>4</sup>	Actual	Unit	Unit		Actual	Actual	Actual	Actual	Unit	Flat-rate <sup>5</sup>		Unit		[Unit][Lump sum]						
	a	Total b	No hours	Total c	d	[e]	f	[g]	Total h	i=0,25 x (a+b+c+f+[g] + h+[j 1] <sup>6</sup> +[j2] <sup>6</sup> -p)		No units	Total [j1]	Total [j2]	k = a+b+c+d+[e] +f+[g] +h+ i + [j1] +[j2]	l	m	n	o	p
[short name beneficiary/linked third party]																				

**The beneficiary/linked third party hereby confirms that:**  
The information provided is complete, reliable and true.  
The costs declared are eligible (see Article 6).  
The costs can be substantiated by adequate records and supporting documentation that will be produced upon request or in the context of checks, reviews, audits and investigations (see Articles 17, 18 and 22).  
For the last reporting period: that all the receipts have been declared (see Article 5.3.3).

📌 Please declare all eligible costs, even if they exceed the amounts indicated in the estimated budget (see Annex 2). Only amounts that were declared in your individual financial statements can be taken into account lateron, in order to replace other costs that are found to be ineligible.

<sup>1</sup> See Article 6 for the eligibility conditions

<sup>2</sup> The indirect costs claimed must be free of any amounts covered by an operating grant (received under any EU or Euratom funding programme; see Article 6.2.E). If you have received an operating grant during this reporting period, you cannot claim indirect costs unless you can demonstrate that the operating grant does not cover any costs of the action.

<sup>3</sup> This is the *theoretical* amount of EU contribution that the system calculates automatically (by multiplying the reimbursement rate by the total costs declared). The amount you request (in the column 'requested EU contribution') may be less,

<sup>4</sup> See Article 5 for the forms of costs

<sup>5</sup> Flat rate : 25% of eligible direct costs, from which are excluded: direct costs of subcontracting, costs of in-kind contributions not used on premises, direct costs of financial support, and unit costs declared under budget category F if they include indirect costs (see Article 6.2.E)

<sup>6</sup> Only specific unit costs that do not include indirect costs

## ANNEX 5

### MODEL FOR THE CERTIFICATE ON THE FINANCIAL STATEMENTS

- For options [*in italics in square brackets*]: choose the applicable option. Options not chosen should be deleted.
- For fields in [grey in square brackets]: enter the appropriate data

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TERMS OF REFERENCE FOR AN INDEPENDENT REPORT OF FACTUAL FINDINGS ON COSTS DECLARED UNDER A GRANT AGREEMENT FINANCED UNDER THE HORIZON 2020 RESEARCH FRAMEWORK PROGRAMME

INDEPENDENT REPORT OF FACTUAL FINDINGS ON COSTS DECLARED UNDER A GRANT AGREEMENT FINANCED UNDER THE HORIZON 2020 RESEARCH FRAMEWORK PROGRAMME



**Terms of Reference for an Independent Report of Factual Findings on costs declared  
under a Grant Agreement financed under the Horizon 2020 Research and Innovation  
Framework Programme**

This document sets out the ‘**Terms of Reference (ToR)**’ under which

[*OPTION 1: [insert name of the beneficiary] (‘the Beneficiary’)*] [*OPTION 2: [insert name of the linked third party] (‘the Linked Third Party’), third party linked to the Beneficiary [insert name of the beneficiary] (‘the Beneficiary’)*]

agrees to engage

[insert legal name of the auditor] (‘the Auditor’)

to produce an independent report of factual findings (‘the Report’) concerning the Financial Statement(s)<sup>1</sup> drawn up by the [Beneficiary] [Linked Third Party] for the Horizon 2020 grant agreement [insert number of the grant agreement, title of the action, acronym and duration from/to] (‘the Agreement’), and

to issue a Certificate on the Financial Statements’ (‘CFS’) referred to in Article 20.4 of the Agreement based on the compulsory reporting template stipulated by the Commission.

The Agreement has been concluded under the Horizon 2020 Research and Innovation Framework Programme (H2020) between the Beneficiary and [*OPTION 1: the European Union, represented by the European Commission (‘the Commission’)*][*OPTION 2: the European Atomic Energy Community (Euratom,) represented by the European Commission (‘the Commission’)*][*OPTION 3: the [Research Executive Agency (REA)] [European Research Council Executive Agency (ERCEA)] [Innovation and Networks Executive Agency (INEA)] [Executive Agency for Small and Medium-sized Enterprises (EASME)] (‘the Agency’), under the powers delegated by the European Commission (‘the Commission’).*]

The [Commission] [Agency] is mentioned as a signatory of the Agreement with the Beneficiary only. The [European Union][Euratom][Agency] is not a party to this engagement.

### **1.1 Subject of the engagement**

The coordinator must submit to the [Commission][Agency] the final report within 60 days following the end of the last reporting period which should include, amongst other documents, a CFS for each beneficiary and for each linked third party that requests a total contribution of EUR 325 000 or more, as reimbursement of actual costs and unit costs calculated on the basis of its usual cost accounting practices (see Article 20.4 of the Agreement). The CFS must cover all reporting periods of the beneficiary or linked third party indicated above.

The Beneficiary must submit to the coordinator the CFS for itself and for its linked third party(ies), if the CFS must be included in the final report according to Article 20.4 of the Agreement.

The CFS is composed of two separate documents:

- The Terms of Reference (‘the ToR’) to be signed by the [Beneficiary] [Linked Third Party] and the Auditor;

---

<sup>1</sup> By which costs under the Agreement are declared (see template ‘Model Financial Statements’ in Annex 4 to the Grant Agreement).

- The Auditor's Independent Report of Factual Findings ('the Report') to be issued on the Auditor's letterhead, dated, stamped and signed by the Auditor (or the competent public officer) which includes the agreed-upon procedures ('the Procedures') to be performed by the Auditor, and the standard factual findings ('the Findings') to be confirmed by the Auditor.

If the CFS must be included in the final report according to Article 20.4 of the Agreement, the request for payment of the balance relating to the Agreement cannot be made without the CFS. However, the payment for reimbursement of costs covered by the CFS does not preclude the Commission [ Agency,] the European Anti-Fraud Office and the European Court of Auditors from carrying out checks, reviews, audits and investigations in accordance with Article 22 of the Agreement.

## 1.2 Responsibilities

The [Beneficiary] [Linked Third Party]:

- must draw up the Financial Statement(s) for the action financed by the Agreement in compliance with the obligations under the Agreement. The Financial Statement(s) must be drawn up according to the [Beneficiary's] [Linked Third Party's] accounting and book-keeping system and the underlying accounts and records;
- must send the Financial Statement(s) to the Auditor;
- is responsible and liable for the accuracy of the Financial Statement(s);
- is responsible for the completeness and accuracy of the information provided to enable the Auditor to carry out the Procedures. It must provide the Auditor with a written representation letter supporting these statements. The written representation letter must state the period covered by the statements and must be dated;
- accepts that the Auditor cannot carry out the Procedures unless it is given full access to the [Beneficiary's] [Linked Third Party's] staff and accounting as well as any other relevant records and documentation.

The Auditor:

- [Option 1 by default: is qualified to carry out statutory audits of accounting documents in accordance with Directive 2006/43/EC of the European Parliament and of the Council of 17 May 2006 on statutory audits of annual accounts and consolidated accounts, amending Council Directives 78/660/EEC and 83/349/EEC and repealing Council Directive 84/253/EEC or similar national regulations].
- [Option 2 if the Beneficiary or Linked Third Party has an independent Public Officer: is a competent and independent Public Officer for which the relevant national authorities have established the legal capacity to audit the Beneficiary].
- [Option 3 if the Beneficiary or Linked Third Party is an international organisation: is an [internal] [external] auditor in accordance with the internal financial regulations and procedures of the international organisation].

The Auditor:

- must be independent from the Beneficiary [and the Linked Third Party], in particular, it must not have been involved in preparing the [Beneficiary's] [Linked Third Party's] Financial Statement(s);
- must plan work so that the Procedures may be carried out and the Findings may be assessed;
- must adhere to the Procedures laid down and the compulsory report format;
- must carry out the engagement in accordance with this ToR;
- must document matters which are important to support the Report;
- must base its Report on the evidence gathered;
- must submit the Report to the [Beneficiary] [Linked Third Party].

The Commission sets out the Procedures to be carried out by the Auditor. The Auditor is not responsible for their suitability or pertinence. As this engagement is not an assurance engagement, the Auditor does not provide an audit opinion or a statement of assurance.

### 1.3 Applicable Standards

The Auditor must comply with these Terms of Reference and with<sup>2</sup>:

- the International Standard on Related Services ('ISRS') 4400 *Engagements to perform Agreed-upon Procedures regarding Financial Information* as issued by the International Auditing and Assurance Standards Board (IAASB);
- the *Code of Ethics for Professional Accountants* issued by the International Ethics Standards Board for Accountants (IESBA). Although ISRS 4400 states that independence is not a requirement for engagements to carry out agreed-upon procedures, the [Commission]/[Agency] requires that the Auditor also complies with the Code's independence requirements.

The Auditor's Report must state that there is no conflict of interests in establishing this Report between the Auditor and the Beneficiary *[and the Linked Third Party]*, and must specify - if the service is invoiced - the total fee paid to the Auditor for providing the Report.

### 1.4 Reporting

The Report must be written in the language of the Agreement (see Article 20.7).

Under Article 22 of the Agreement, the Commission[, the Agency], the European Anti-Fraud Office and the Court of Auditors have the right to audit any work that is carried out under the action and for which costs are declared from [the European Union] [Euratom] budget. This includes work related to this engagement. The Auditor must provide access to all working papers (e.g. recalculation of hourly rates, verification of the time declared for the action) related to this assignment if the Commission [, the Agency], the European Anti-Fraud Office or the European Court of Auditors requests them.

### 1.5 Timing

The Report must be provided by [dd Month yyyy].

### 1.6 Other terms

*[The [Beneficiary] [Linked Third Party] and the Auditor can use this section to agree other specific terms, such as the Auditor's fees, liability, applicable law, etc. Those specific terms must not contradict the terms specified above.]*

[legal name of the Auditor]	[legal name of the [Beneficiary]/[Linked Third Party]]
[name & function of authorised representative]	[name & function of authorised representative]
[dd Month yyyy]	[dd Month yyyy]
Signature of the Auditor	Signature of the [Beneficiary]/[Linked Third Party]

<sup>2</sup> Supreme Audit Institutions applying INTOSAI-standards may carry out the Procedures according to the corresponding International Standards of Supreme Audit Institutions and code of ethics issued by INTOSAI instead of the International Standard on Related Services ('ISRS') 4400 and the Code of Ethics for Professional Accountants issued by the IAASB and the IESBA.

**Independent Report of Factual Findings on costs declared  
under Horizon 2020 Research and Innovation Framework Programme**

*(To be printed on the Auditor's letterhead)*

To  
[ name of contact person(s)], [Position]  
[ [Beneficiary's] [Linked Third Party's] name ]  
[ Address]  
[ dd Month yyyy]

Dear [Name of contact person(s)],

As agreed under the terms of reference dated [dd Month yyyy]

with [OPTION 1: [insert name of the beneficiary] ('the Beneficiary')] [OPTION 2: [insert name of the linked third party] ('the Linked Third Party'), third party linked to the Beneficiary [insert name of the beneficiary] ('the Beneficiary')],

we

[name of the auditor] ('the Auditor'),  
established at  
[full address/city/state/province/country],  
represented by  
[name and function of an authorised representative],

have carried out the procedures agreed with you regarding the costs declared in the Financial Statement(s)<sup>3</sup> of the [Beneficiary] [Linked Third Party] concerning the grant agreement [insert grant agreement reference: number, title of the action and acronym] ('the Agreement'),

with a total cost declared of  
[total amount] EUR,

and a total of actual costs and unit costs calculated in accordance with the [Beneficiary's] [Linked Third Party's] usual cost accounting practices' declared of

[sum of total actual costs and total direct personnel costs declared as unit costs calculated in accordance with the [Beneficiary's] [Linked Third Party's] usual cost accounting practices] EUR

and **hereby provide our Independent Report of Factual Findings ('the Report')** using the compulsory report format agreed with you.

**The Report**

Our engagement was carried out in accordance with the terms of reference ('the ToR') appended to this Report. The Report includes the agreed-upon procedures ('the Procedures') carried out and the standard factual findings ('the Findings') examined.

---

<sup>3</sup> By which the Beneficiary declares costs under the Agreement (see template 'Model Financial Statement' in Annex 4 to the Agreement).

The Procedures were carried out solely to assist the [Commission] [Agency] in evaluating whether the [Beneficiary's] [Linked Third Party's] costs in the accompanying Financial Statement(s) were declared in accordance with the Agreement. The [Commission] [Agency] draws its own conclusions from the Report and any additional information it may require.

The scope of the Procedures was defined by the Commission. Therefore, the Auditor is not responsible for their suitability or pertinence. Since the Procedures carried out constitute neither an audit nor a review made in accordance with International Standards on Auditing or International Standards on Review Engagements, the Auditor does not give a statement of assurance on the Financial Statements.

Had the Auditor carried out additional procedures or an audit of the [Beneficiary's] [Linked Third Party's] Financial Statements in accordance with International Standards on Auditing or International Standards on Review Engagements, other matters might have come to its attention and would have been included in the Report.

### **Not applicable Findings**

We examined the Financial Statement(s) stated above and considered the following Findings not applicable:

*Explanation (to be removed from the Report):*

*If a Finding was not applicable, it must be marked as 'N.A.' ('Not applicable') in the corresponding row on the right-hand column of the table and means that the Finding did not have to be corroborated by the Auditor and the related Procedure(s) did not have to be carried out.*

*The reasons of the non-application of a certain Finding must be obvious i.e.*

- i) if no cost was declared under a certain category then the related Finding(s) and Procedure(s) are not applicable;*
- ii) if the condition set to apply certain Procedure(s) are not met the related Finding(s) and those Procedure(s) are not applicable. For instance, for 'beneficiaries with accounts established in a currency other than euro' the Procedure and Finding related to 'beneficiaries with accounts established in euro' are not applicable. Similarly, if no additional remuneration is paid, the related Finding(s) and Procedure(s) for additional remuneration are not applicable.*

**List here all Findings considered not applicable for the present engagement and explain the reasons of the non-applicability.**

....

### **Exceptions**

Apart from the exceptions listed below, the [Beneficiary] [Linked Third Party] provided the Auditor all the documentation and accounting information needed by the Auditor to carry out the requested Procedures and evaluate the Findings.

*Explanation (to be removed from the Report):*

- If the Auditor was not able to successfully complete a procedure requested, it must be marked as 'E' ('Exception') in the corresponding row on the right-hand column of the table. The reason such as the inability to reconcile key information or the unavailability of data that prevents the Auditor from carrying out the Procedure must be indicated below.*
- If the Auditor cannot corroborate a standard finding after having carried out the corresponding procedure, it must also be marked as 'E' ('Exception') and, where possible, the reasons why the Finding was not fulfilled and its possible impact must be explained here below.*

**List here any exceptions and add any information on the cause and possible consequences of each exception, if known. If the exception is quantifiable, include the corresponding amount.**

....

**Example (to be removed from the Report):**

1. *The Beneficiary was unable to substantiate the Finding number 1 on ... because ...*
2. *Finding number 30 was not fulfilled because the methodology used by the Beneficiary to calculate unit costs was different from the one approved by the Commission. The differences were as follows: ...*
3. *After carrying out the agreed procedures to confirm the Finding number 31, the Auditor found a difference of \_\_\_\_\_ EUR. The difference can be explained by ...*

**Further Remarks**

In addition to reporting on the results of the specific procedures carried out, the Auditor would like to make the following general remarks:

**Example (to be removed from the Report):**

1. *Regarding Finding number 8 the conditions for additional remuneration were considered as fulfilled because ...*
2. *In order to be able to confirm the Finding number 15 we carried out the following additional procedures: ....*

**Use of this Report**

This Report may be used only for the purpose described in the above objective. It was prepared solely for the confidential use of the [Beneficiary] [Linked Third Party] and the [Commission] [Agency], and only to be submitted to the [Commission] [Agency] in connection with the requirements set out in Article 20.4 of the Agreement. The Report may not be used by the [Beneficiary] [Linked Third Party] or by the [Commission] [Agency] for any other purpose, nor may it be distributed to any other parties. The [Commission] [Agency] may only disclose the Report to authorised parties, in particular to the European Anti-Fraud Office (OLAF) and the European Court of Auditors.

This Report relates only to the Financial Statement(s) submitted to the [Commission] [Agency] by the [Beneficiary] [Linked Third Party] for the Agreement. Therefore, it does not extend to any other of the [Beneficiary's] [Linked Third Party's] Financial Statement(s).

There was no conflict of interest<sup>4</sup> between the Auditor and the Beneficiary [and Linked Third Party] in establishing this Report. The total fee paid to the Auditor for providing the Report was EUR [ ] (including EUR [ ] of deductible VAT).

We look forward to discussing our Report with you and would be pleased to provide any further information or assistance.

[legal name of the Auditor]

[name and function of an authorised representative]

[dd Month yyyy]

Signature of the Auditor

<sup>4</sup> A conflict of interest arises when the Auditor's objectivity to establish the certificate is compromised in fact or in appearance when the Auditor for instance:

- was involved in the preparation of the Financial Statements;
- stands to benefit directly should the certificate be accepted;
- has a close relationship with any person representing the beneficiary;
- is a director, trustee or partner of the beneficiary; or
- is in any other situation that compromises his or her independence or ability to establish the certificate impartially.



**Agreed-upon procedures to be performed and standard factual findings to be confirmed by the Auditor**

The European Commission reserves the right to i) provide the auditor with additional guidance regarding the procedures to be followed or the facts to be ascertained and the way in which to present them (this may include sample coverage and findings) or to ii) change the procedures, by notifying the Beneficiary in writing. The procedures carried out by the auditor to confirm the standard factual finding are listed in the table below.

If this certificate relates to a Linked Third Party, any reference here below to ‘the Beneficiary’ is to be considered as a reference to ‘the Linked Third Party’.

The ‘result’ column has three different options: ‘C’, ‘E’ and ‘N.A.’:

- ‘C’ stands for ‘confirmed’ and means that the auditor can confirm the ‘standard factual finding’ and, therefore, there is no exception to be reported.
- ‘E’ stands for ‘exception’ and means that the Auditor carried out the procedures but cannot confirm the ‘standard factual finding’, or that the Auditor was not able to carry out a specific procedure (e.g. because it was impossible to reconcile key information or data were unavailable),
- ‘N.A.’ stands for ‘not applicable’ and means that the Finding did not have to be examined by the Auditor and the related Procedure(s) did not have to be carried out. The reasons of the non-application of a certain Finding must be obvious i.e. i) if no cost was declared under a certain category then the related Finding(s) and Procedure(s) are not applicable; ii) if the condition set to apply certain Procedure(s) are not met then the related Finding(s) and Procedure(s) are not applicable. For instance, for ‘beneficiaries with accounts established in a currency other than the euro’ the Procedure related to ‘beneficiaries with accounts established in euro’ is not applicable. Similarly, if no additional remuneration is paid, the related Finding(s) and Procedure(s) for additional remuneration are not applicable.

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
A	<b>ACTUAL PERSONNEL COSTS AND UNIT COSTS CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICE</b>		
	<p>The Auditor draws a sample of persons whose costs were declared in the Financial Statement(s) to carry out the procedures indicated in the consecutive points of this section A.</p> <p><i>(The sample should be selected randomly so that it is representative. Full coverage is required if there are fewer than 10 people (including employees, natural persons working under a direct contract and personnel seconded by a third party), otherwise the sample should have a minimum of 10 people, or 10% of the total, whichever number is the highest)</i></p> <p>The Auditor sampled [ ] people out of the total of [ ] people.</p>		



Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
A.1	<p><b>PERSONNEL COSTS</b></p> <p><u>For the persons included in the sample and working under an employment contract or equivalent act (general procedures for individual actual personnel costs and personnel costs declared as unit costs)</u></p> <p>To confirm standard factual findings 1-5 listed in the next column, the Auditor reviewed following information/documents provided by the Beneficiary:</p> <ul style="list-style-type: none"> <li>○ a list of the persons included in the sample indicating the period(s) during which they worked for the action, their position (classification or category) and type of contract;</li> <li>○ the payslips of the employees included in the sample;</li> <li>○ reconciliation of the personnel costs declared in the Financial Statement(s) with the accounting system (project accounting and general ledger) and payroll system;</li> <li>○ information concerning the employment status and employment conditions of personnel included in the sample, in particular their employment contracts or equivalent;</li> <li>○ the Beneficiary's usual policy regarding payroll matters (e.g. salary policy, overtime policy, variable pay);</li> <li>○ applicable national law on taxes, labour and social security and</li> <li>○ any other document that supports the personnel costs declared.</li> </ul> <p>The Auditor also verified the eligibility of all components of the retribution (see Article 6 GA) and recalculated the personnel costs for employees included in the sample.</p>	1) The employees were i) directly hired by the Beneficiary in accordance with its national legislation, ii) under the Beneficiary's sole technical supervision and responsibility and iii) remunerated in accordance with the Beneficiary's usual practices.	
		2) Personnel costs were recorded in the Beneficiary's accounts/payroll system.	
		3) Costs were adequately supported and reconciled with the accounts and payroll records.	
		4) Personnel costs did not contain any ineligible elements.	
		5) There were no discrepancies between the personnel costs charged to the action and the costs recalculated by the Auditor.	
	<p><i>Further procedures if 'additional remuneration' is paid</i></p> <p>To confirm standard factual findings 6-9 listed in the next column, the Auditor:</p> <ul style="list-style-type: none"> <li>○ reviewed relevant documents provided by the Beneficiary (legal form, legal/statutory</li> </ul>	6) The Beneficiary paying "additional remuneration" was a non-profit legal entity.	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<p>obligations, the Beneficiary's usual policy on additional remuneration, criteria used for its calculation, the Beneficiary's usual remuneration practice for projects funded under national funding schemes...);</p> <ul style="list-style-type: none"> <li>recalculated the amount of additional remuneration eligible for the action based on the supporting documents received (full-time or part-time work, exclusive or non-exclusive dedication to the action, usual remuneration paid for projects funded by national schemes) to arrive at the applicable FTE/year and pro-rata rate (see data collected in the course of carrying out the procedures under A.2 'Productive hours' and A.4 'Time recording system').</li> </ul> <p><i>'ADDITIONAL REMUNERATION' MEANS ANY PART OF THE REMUNERATION WHICH EXCEEDS WHAT THE PERSON WOULD BE PAID FOR TIME WORKED IN PROJECTS FUNDED BY NATIONAL SCHEMES.</i></p> <p><i>IF ANY PART OF THE REMUNERATION PAID TO THE EMPLOYEE QUALIFIES AS "ADDITIONAL REMUNERATION" AND IS ELIGIBLE UNDER THE PROVISIONS OF ARTICLE 6.2.A.1, THIS CAN BE CHARGED AS ELIGIBLE COST TO THE ACTION UP TO THE FOLLOWING AMOUNT:</i></p> <p>(A) <i>IF THE PERSON WORKS FULL TIME AND EXCLUSIVELY ON THE ACTION DURING THE FULL YEAR: UP TO EUR 8 000/YEAR;</i></p> <p>(B) <i>IF THE PERSON WORKS EXCLUSIVELY ON THE ACTION BUT NOT FULL-TIME OR NOT FOR THE FULL YEAR: UP TO THE CORRESPONDING PRO-RATA AMOUNT OF EUR 8 000, OR</i></p> <p>(C) <i>IF THE PERSON DOES NOT WORK EXCLUSIVELY ON THE ACTION: UP TO A PRO-RATA AMOUNT CALCULATED IN ACCORDANCE TO ARTICLE 6.2.A.1.</i></p>	<p>7) The amount of additional remuneration paid corresponded to the Beneficiary's usual remuneration practices and was consistently paid whenever the same kind of work or expertise was required.</p>	
		<p>8) The criteria used to calculate the additional remuneration were objective and generally applied by the Beneficiary regardless of the source of funding used.</p>	
		<p>9) The amount of additional remuneration included in the personnel costs charged to the action was capped at EUR 8,000 per FTE/year (up to the equivalent pro-rata amount if the person did not work on the action full-time during the year or did not work exclusively on the action).</p>	
	<p><i>Additional procedures in case "unit costs calculated by the Beneficiary in accordance with its usual cost accounting practices" is applied:</i></p> <p>Apart from carrying out the procedures indicated above to confirm standard factual findings 1-5 and, if applicable, also 6-9, the Auditor carried out following procedures to confirm standard</p>	<p>10) The personnel costs included in the Financial Statement were calculated in accordance with the Beneficiary's usual cost accounting practice. This methodology was consistently</p>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<p>factual findings 10-13 listed in the next column:</p> <ul style="list-style-type: none"> <li>obtained a description of the Beneficiary's usual cost accounting practice to calculate unit costs;</li> <li>reviewed whether the Beneficiary's usual cost accounting practice was applied for the Financial Statements subject of the present CFS;</li> <li>verified the employees included in the sample were charged under the correct category (in accordance with the criteria used by the Beneficiary to establish personnel categories) by reviewing the contract/HR-record or analytical accounting records;</li> <li>verified that there is no difference between the total amount of personnel costs used in calculating the cost per unit and the total amount of personnel costs recorded in the statutory accounts;</li> <li>verified whether actual personnel costs were adjusted on the basis of budgeted or estimated elements and, if so, verified whether those elements used are actually relevant for the calculation, objective and supported by documents.</li> </ul>	used in all H2020 actions.	
		11) The employees were charged under the correct category.	
		12) Total personnel costs used in calculating the unit costs were consistent with the expenses recorded in the statutory accounts.	
		13) Any estimated or budgeted element used by the Beneficiary in its unit-cost calculation were relevant for calculating personnel costs and corresponded to objective and verifiable information.	
	<p><u>For natural persons included in the sample and working with the Beneficiary under a direct contract other than an employment contract, such as consultants (no subcontractors).</u></p> <p>To confirm standard factual findings 14-17 listed in the next column the Auditor reviewed following information/documents provided by the Beneficiary:</p> <ul style="list-style-type: none"> <li>the contracts, especially the cost, contract duration, work description, place of work, ownership of the results and reporting obligations to the Beneficiary;</li> <li>the employment conditions of staff in the same category to compare costs and;</li> <li>any other document that supports the costs declared and its registration (e.g. invoices, accounting records, etc.).</li> </ul>	14) The natural persons worked under conditions similar to those of an employee, in particular regarding the way the work is organised, the tasks that are performed and the premises where they are performed.	
		15) The results of work carried out belong to the Beneficiary, or, if not, the Beneficiary has obtained all necessary rights to fulfil its obligations as if those	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
		results were generated by itself.	
		16) Their costs were not significantly different from those for staff who performed similar tasks under an employment contract with the Beneficiary.	
		17) The costs were supported by audit evidence and registered in the accounts.	
	<p><u>For personnel seconded by a third party and included in the sample (not subcontractors)</u></p> <p>To confirm standard factual findings 18-21 listed in the next column, the Auditor reviewed following information/documents provided by the Beneficiary:</p> <ul style="list-style-type: none"> <li>○ their secondment contract(s) notably regarding costs, duration, work description, place of work and ownership of the results;</li> <li>○ if there is reimbursement by the Beneficiary to the third party for the resource made available (in-kind contribution against payment): any documentation that supports the costs declared (e.g. contract, invoice, bank payment, and proof of registration in its accounting/payroll, etc.) and reconciliation of the Financial Statement(s) with the accounting system (project accounting and general ledger) as well as any proof that the amount invoiced by the third party did not include any profit;</li> <li>○ if there is no reimbursement by the Beneficiary to the third party for the resource made available (in-kind contribution free of charge): a proof of the actual cost borne by the Third Party for the resource made available free of charge to the Beneficiary such as a statement of costs incurred by the Third Party and proof of the registration in the Third Party's accounting/payroll;</li> </ul>	18) Seconded personnel reported to the Beneficiary and worked on the Beneficiary's premises (unless otherwise agreed with the Beneficiary).	
		19) The results of work carried out belong to the Beneficiary, or, if not, the Beneficiary has obtained all necessary rights to fulfil its obligations as if those results were generated by itself..	
		<p><i>If personnel is seconded against payment:</i></p> <p>20) The costs declared were supported with documentation and recorded in the</p>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<ul style="list-style-type: none"> <li>any other document that supports the costs declared (e.g. invoices, etc.).</li> </ul>	Beneficiary's accounts. The third party did not include any profit.	
		<i>If personnel is seconded free of charge:</i>  21) The costs declared did not exceed the third party's cost as recorded in the accounts of the third party and were supported with documentation.	
A.2	<b>PRODUCTIVE HOURS</b>  To confirm standard factual findings 22-27 listed in the next column, the Auditor reviewed relevant documents, especially national legislation, labour agreements and contracts and time records of the persons included in the sample, to verify that: <ul style="list-style-type: none"> <li>the annual productive hours applied were calculated in accordance with one of the methods described below,</li> <li>the full-time equivalent (FTEs) ratios for employees not working full-time were correctly calculated.</li> </ul> If the Beneficiary applied method B, the auditor verified that the correctness in which the total number of hours worked was calculated and that the contracts specified the annual workable hours.  If the Beneficiary applied method C, the auditor verified that the 'annual productive hours' applied when calculating the hourly rate were equivalent to at least 90 % of the 'standard annual workable hours'. The Auditor can only do this if the calculation of the standard annual workable	22) The Beneficiary applied method [choose one option and delete the others]  [A: 1720 hours]  [B: the 'total number of hours worked']  [C: 'standard annual productive hours' used correspond to usual accounting practices]	
		23) Productive hours were calculated annually.	
		24) For employees not working full-time the full-time equivalent (FTE) ratio was correctly applied.	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<p>hours can be supported by records, such as national legislation, labour agreements, and contracts.</p> <p><i>BENEFICIARY'S PRODUCTIVE HOURS' FOR PERSONS WORKING FULL TIME SHALL BE ONE OF THE FOLLOWING METHODS:</i></p> <p><i>A. 1720 ANNUAL PRODUCTIVE HOURS (PRO-RATA FOR PERSONS NOT WORKING FULL-TIME)</i></p> <p><i>B. THE TOTAL NUMBER OF HOURS WORKED BY THE PERSON FOR THE BENEFICIARY IN THE YEAR (THIS METHOD IS ALSO REFERRED TO AS 'TOTAL NUMBER OF HOURS WORKED' IN THE NEXT COLUMN). THE CALCULATION OF THE TOTAL NUMBER OF HOURS WORKED WAS DONE AS FOLLOWS: ANNUAL WORKABLE HOURS OF THE PERSON ACCORDING TO THE EMPLOYMENT CONTRACT, APPLICABLE LABOUR AGREEMENT OR NATIONAL LAW PLUS OVERTIME WORKED MINUS ABSENCES (SUCH AS SICK LEAVE OR SPECIAL LEAVE).</i></p> <p><i>C. THE STANDARD NUMBER OF ANNUAL HOURS GENERALLY APPLIED BY THE BENEFICIARY FOR ITS PERSONNEL IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICES (THIS METHOD IS ALSO REFERRED TO AS 'STANDARD ANNUAL PRODUCTIVE HOURS' IN THE NEXT COLUMN). THIS NUMBER MUST BE AT LEAST 90% OF THE STANDARD ANNUAL WORKABLE HOURS.</i></p> <p><i>'ANNUAL WORKABLE HOURS' MEANS THE PERIOD DURING WHICH THE PERSONNEL MUST BE WORKING, AT THE EMPLOYER'S DISPOSAL AND CARRYING OUT HIS/HER ACTIVITY OR DUTIES UNDER THE EMPLOYMENT CONTRACT, APPLICABLE COLLECTIVE LABOUR AGREEMENT OR NATIONAL WORKING TIME LEGISLATION.</i></p>	<p><i>If the Beneficiary applied method B.</i></p> <p>25) The calculation of the number of 'annual workable hours', overtime and absences was verifiable based on the documents provided by the Beneficiary.</p> <p>25.1) The Beneficiary calculates the hourly rates per full financial year following procedure A.3 (method B is not allowed for beneficiaries calculating hourly rates per month).</p> <p><i>If the Beneficiary applied method C.</i></p> <p>26) The calculation of the number of 'standard annual workable hours' was verifiable based on the documents provided by the Beneficiary.</p>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
		27) The 'annual productive hours' used for calculating the hourly rate were consistent with the usual cost accounting practices of the Beneficiary and were equivalent to at least 90 % of the 'annual workable hours'.	
A.3	<p><b>HOURLY PERSONNEL RATES</b></p> <p><u>I) For unit costs calculated in accordance to the Beneficiary's usual cost accounting practice (unit costs):</u></p> <p>If the Beneficiary has a "Certificate on Methodology to calculate unit costs " (CoMUC) approved by the Commission, the Beneficiary provides the Auditor with a description of the approved methodology and the Commission's letter of acceptance. The Auditor verified that the Beneficiary has indeed used the methodology approved. If so, no further verification is necessary.</p> <p>If the Beneficiary does not have a "Certificate on Methodology" (CoMUC) approved by the Commission, or if the methodology approved was not applied, then the Auditor:</p> <ul style="list-style-type: none"> <li>○ reviewed the documentation provided by the Beneficiary, including manuals and internal guidelines that explain how to calculate hourly rates;</li> <li>○ recalculated the unit costs (hourly rates) of staff included in the sample following the results of the procedures carried out in A.1 and A.2.</li> </ul> <p><u>II) For individual hourly rates:</u></p> <p>The Auditor:</p> <ul style="list-style-type: none"> <li>○ reviewed the documentation provided by the Beneficiary, including manuals and internal guidelines that explain how to calculate hourly rates;</li> </ul>	<p>28) The Beneficiary applied [<i>choose one option and delete the other</i>]:</p> <p>[Option I: "Unit costs (hourly rates) were calculated in accordance with the Beneficiary's usual cost accounting practices"]</p> <p>[Option II: Individual hourly rates were applied]</p> <p><i>For option I concerning unit costs and if the Beneficiary applies the methodology approved by the Commission (CoMUC):</i></p> <p>29) The Beneficiary used the Commission-approved methodology to calculate hourly rates. It corresponded to the organisation's usual cost accounting practices and was applied consistently for all</p>	



Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	<ul style="list-style-type: none"> <li>recalculated the hourly rates of staff included in the sample (recalculation of all hourly rates if the Beneficiary uses annual rates, recalculation of three months selected randomly for every year and person if the Beneficiary uses monthly rates) following the results of the procedures carried out in A.1 and A.2;</li> <li>(only in case of monthly rates) confirmed that the time spent on parental leave is not deducted, and that, if parts of the basic remuneration are generated over a period longer than a month, the Beneficiary has included only the share which is generated in the month.</li> </ul> <p><u>“UNIT COSTS CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH ITS USUAL COST ACCOUNTING PRACTICES”:</u>  <i>IT IS CALCULATED BY DIVIDING THE TOTAL AMOUNT OF PERSONNEL COSTS OF THE CATEGORY TO WHICH THE EMPLOYEE BELONGS VERIFIED IN LINE WITH PROCEDURE A.1 BY THE NUMBER OF FTE AND THE ANNUAL TOTAL PRODUCTIVE HOURS OF THE SAME CATEGORY CALCULATED BY THE BENEFICIARY IN ACCORDANCE WITH PROCEDURE A.2.</i></p> <p><u>HOURLY RATE FOR INDIVIDUAL ACTUAL PERSONAL COSTS:</u>  <i>IT IS CALCULATED FOLLOWING ONE OF THE TWO OPTIONS BELOW:</i></p> <p><i>A) [OPTION BY DEFAULT] BY DIVIDING THE ACTUAL ANNUAL AMOUNT OF PERSONNEL COSTS OF AN EMPLOYEE VERIFIED IN LINE WITH PROCEDURE A.1 BY THE NUMBER OF ANNUAL PRODUCTIVE HOURS VERIFIED IN LINE WITH PROCEDURE A.2 (FULL FINANCIAL YEAR HOURLY RATE);</i></p> <p><i>B) BY DIVIDING THE ACTUAL MONTHLY AMOUNT OF PERSONNEL COSTS OF AN EMPLOYEE VERIFIED IN LINE WITH PROCEDURE A.1 BY 1/12 OF THE NUMBER OF ANNUAL PRODUCTIVE HOURS VERIFIED IN LINE WITH PROCEDURE A.2.(MONTHLY HOURLY RATE).</i></p>	activities irrespective of the source of funding.	
		<p><i>For option I concerning unit costs and if the Beneficiary applies a methodology not approved by the Commission:</i></p> <p>30) The unit costs re-calculated by the Auditor were the same as the rates applied by the Beneficiary.</p>	
		<p><i>For option II concerning individual hourly rates:</i></p> <p>31) The individual rates re-calculated by the Auditor were the same as the rates applied by the Beneficiary.</p> <p>31.1) The Beneficiary used only one option (per full financial year or per month) throughout each financial year examined.</p> <p>31.2) The hourly rates do not include additional remuneration.</p>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
A.4	<b>TIME RECORDING SYSTEM</b> To verify that the time recording system ensures the fulfilment of all minimum requirements and that the hours declared for the action were correct, accurate and properly authorised and supported by documentation, the Auditor made the following checks for the persons included in the sample that declare time as worked for the action on the basis of time records: <ul style="list-style-type: none"> <li>○ description of the time recording system provided by the Beneficiary (registration, authorisation, processing in the HR-system);</li> <li>○ its actual implementation;</li> <li>○ time records were signed at least monthly by the employees (on paper or electronically) and authorised by the project manager or another manager;</li> <li>○ the hours declared were worked within the project period;</li> <li>○ there were no hours declared as worked for the action if HR-records showed absence due to holidays or sickness (further cross-checks with travels are carried out in B.1 below) ;</li> <li>○ the hours charged to the action matched those in the time recording system.</li> </ul>	32) All persons recorded their time dedicated to the action on a <b>daily/ weekly/ monthly</b> basis using a <b>paper/computer-based</b> system. <i>(delete the answers that are not applicable)</i>	
		33) Their time-records were authorised at least monthly by the project manager or other superior.	
		34) Hours declared were worked within the project period and were consistent with the presences/absences recorded in HR-records.	
		35) There were no discrepancies between the number of hours charged to the action and the number of hours recorded.	
	<p><i>ONLY THE HOURS WORKED ON THE ACTION CAN BE CHARGED. ALL WORKING TIME TO BE CHARGED SHOULD BE RECORDED THROUGHOUT THE DURATION OF THE PROJECT, ADEQUATELY SUPPORTED BY EVIDENCE OF THEIR REALITY AND RELIABILITY (SEE SPECIFIC PROVISIONS BELOW FOR PERSONS WORKING EXCLUSIVELY FOR THE ACTION WITHOUT TIME RECORDS).</i></p> <p><u>If the persons are working exclusively for the action and without time records</u></p> <p>For the persons selected that worked exclusively for the action without time records, the Auditor verified evidence available demonstrating that they were in reality exclusively dedicated to the action and that the Beneficiary signed a declaration confirming that they have worked exclusively for the action.</p>	36) The exclusive dedication is supported by a declaration signed by the Beneficiary and by any other evidence gathered.	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
<b>B</b>	<b>COSTS OF SUBCONTRACTING</b>		
<b>B.1</b>	<p><b>The Auditor obtained the detail/breakdown of subcontracting costs and sampled cost items selected randomly</b> (full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest).</p> <p>To confirm standard factual findings 37-41 listed in the next column, the Auditor reviewed the following for the items included in the sample:</p> <ul style="list-style-type: none"> <li>○ the use of subcontractors was foreseen in Annex 1;</li> <li>○ subcontracting costs were declared in the subcontracting category of the Financial Statement;</li> <li>○ supporting documents on the selection and award procedure were followed;</li> <li>○ the Beneficiary ensured best value for money (key elements to appreciate the respect of this principle are the award of the subcontract to the bid offering best price-quality ratio, under conditions of transparency and equal treatment. In case an existing framework contract was used the Beneficiary ensured it was established on the basis of the principle of best value for money under conditions of transparency and equal treatment).</li> </ul> <p>In particular,</p> <ol style="list-style-type: none"> <li>i. if the Beneficiary acted as a contracting authority within the meaning of Directive 2004/18/EC (or 2014/24/EU) or of Directive 2004/17/EC (or 2014/25/EU), the Auditor verified that the applicable national law on public procurement was followed and that the subcontracting complied with the Terms and Conditions of the Agreement.</li> <li>ii. if the Beneficiary did not fall under the above-mentioned category the Auditor verified that the Beneficiary followed their usual procurement rules and respected the Terms and Conditions of the Agreement..</li> </ol>	<p>37) The use of claimed subcontracting costs was foreseen in Annex 1 and costs were declared in the Financial Statements under the subcontracting category.</p> <p>38) There were documents of requests to different providers, different offers and assessment of the offers before selection of the provider in line with internal procedures and procurement rules. Subcontracts were awarded in accordance with the principle of best value for money.</p> <p><i>(When different offers were not collected the Auditor explains the reasons provided by the Beneficiary under the caption “Exceptions” of the Report. The Commission will analyse this information to evaluate whether these costs might be accepted as eligible)</i></p> <p>39) The subcontracts were not awarded to other Beneficiaries</p>	

Ref	Procedures	Standard factual finding	Result (C / E / N.A.)
	For the items included in the sample the Auditor also verified that: <ul style="list-style-type: none"> <li>○ the subcontracts were not awarded to other Beneficiaries in the consortium;</li> <li>○ there were signed agreements between the Beneficiary and the subcontractor;</li> <li>○ there was evidence that the services were provided by subcontractor;</li> </ul>	of the consortium.	
		40) All subcontracts were supported by signed agreements between the Beneficiary and the subcontractor.	
		41) There was evidence that the services were provided by the subcontractors.	
<b>C</b>	<b>COSTS OF PROVIDING FINANCIAL SUPPORT TO THIRD PARTIES</b>		
<b>C.1</b>	<p><b>The Auditor obtained the detail/breakdown of the costs of providing financial support to third parties and sampled [ ] cost items selected randomly</b> <i>(full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest).</i></p> <p>The Auditor verified that the following minimum conditions were met:</p> <ul style="list-style-type: none"> <li>a) the maximum amount of financial support for each third party did not exceed EUR 60 000, unless explicitly mentioned in Annex 1;</li> <li>b) the financial support to third parties was agreed in Annex 1 of the Agreement and the other provisions on financial support to third parties included in Annex 1 were respected.</li> </ul>	42) All minimum conditions were met	

D	OTHER ACTUAL DIRECT COSTS		
D.1	<b>COSTS OF TRAVEL AND RELATED SUBSISTENCE ALLOWANCES</b>  <b>The Auditor sampled [ ] cost items selected randomly</b> ( <i>full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is the highest</i> ).  The Auditor inspected the sample and verified that: <ul style="list-style-type: none"> <li>○ travel and subsistence costs were consistent with the Beneficiary's usual policy for travel. In this context, the Beneficiary provided evidence of its normal policy for travel costs (e.g. use of first class tickets, reimbursement by the Beneficiary on the basis of actual costs, a lump sum or per diem) to enable the Auditor to compare the travel costs charged with this policy;</li> <li>○ travel costs are correctly identified and allocated to the action (e.g. trips are directly linked to the action) by reviewing relevant supporting documents such as minutes of meetings, workshops or conferences, their registration in the correct project account, their consistency with time records or with the dates/duration of the workshop/conference;</li> <li>○ no ineligible costs or excessive or reckless expenditure was declared (see Article 6.5 MGA).</li> </ul>	43) Costs were incurred, approved and reimbursed in line with the Beneficiary's usual policy for travels.	
		44) There was a link between the trip and the action.	
		45) The supporting documents were consistent with each other regarding subject of the trip, dates, duration and reconciled with time records and accounting.	
		46) No ineligible costs or excessive or reckless expenditure was declared.	
D.2	<b>DEPRECIATION COSTS FOR EQUIPMENT, INFRASTRUCTURE OR OTHER ASSETS</b>  <b>The Auditor sampled [ ] cost items selected randomly</b> ( <i>full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is the highest</i> ).  For “equipment, infrastructure or other assets” [from now on called “asset(s)”] selected in the sample the Auditor verified that: <ul style="list-style-type: none"> <li>○ the assets were acquired in conformity with the Beneficiary's internal guidelines and procedures;</li> </ul>	47) Procurement rules, principles and guides were followed.	
		48) There was a link between the grant agreement and the asset charged to the action.	
		49) The asset charged to the action was traceable to the accounting records and the underlying documents.	

	<ul style="list-style-type: none"> <li>○ they were correctly allocated to the action (with supporting documents such as delivery note invoice or any other proof demonstrating the link to the action)</li> <li>○ they were entered in the accounting system;</li> <li>○ the extent to which the assets were used for the action (as a percentage) was supported by reliable documentation (e.g. usage overview table);</li> </ul> <p>The Auditor recalculated the depreciation costs and verified that they were in line with the applicable rules in the Beneficiary's country and with the Beneficiary's usual accounting policy (e.g. depreciation calculated on the acquisition value).</p> <p>The Auditor verified that no ineligible costs such as deductible VAT, exchange rate losses, excessive or reckless expenditure were declared (see Article 6.5 GA).</p>	50) The depreciation method used to charge the asset to the action was in line with the applicable rules of the Beneficiary's country and the Beneficiary's usual accounting policy.	
		51) The amount charged corresponded to the actual usage for the action.	
		52) No ineligible costs or excessive or reckless expenditure were declared.	
<b>D.3</b>	<p><b>COSTS OF OTHER GOODS AND SERVICES</b></p> <p><b>The Auditor sampled [ ] cost items selected randomly</b> (<i>full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest</i>).</p> <p>For the purchase of goods, works or services included in the sample the Auditor verified that:</p> <ul style="list-style-type: none"> <li>○ the contracts did not cover tasks described in Annex 1;</li> <li>○ they were correctly identified, allocated to the proper action, entered in the accounting system (traceable to underlying documents such as purchase orders, invoices and accounting);</li> <li>○ the goods were not placed in the inventory of durable equipment;</li> <li>○ the costs charged to the action were accounted in line with the Beneficiary's usual accounting practices;</li> <li>○ no ineligible costs or excessive or reckless expenditure were declared (see Article 6 GA).</li> </ul> <p>In addition, the Auditor verified that these goods and services were acquired in conformity with</p>	53) Contracts for works or services did not cover tasks described in Annex 1.	
		54) Costs were allocated to the correct action and the goods were not placed in the inventory of durable equipment.	
		55) The costs were charged in line with the Beneficiary's accounting policy and were adequately supported.	
		56) No ineligible costs or excessive or reckless expenditure were declared. For internal invoices/charges only the cost element was charged, without any mark-ups.	

	<p>the Beneficiary's internal guidelines and procedures, in particular:</p> <ul style="list-style-type: none"> <li>○ if Beneficiary acted as a contracting authority within the meaning of Directive 2004/18/EC (or 2014/24/EU) or of Directive 2004/17/EC (or 2014/25/EU), the Auditor verified that the applicable national law on public procurement was followed and that the procurement contract complied with the Terms and Conditions of the Agreement.</li> <li>○ if the Beneficiary did not fall into the category above, the Auditor verified that the Beneficiary followed their usual procurement rules and respected the Terms and Conditions of the Agreement.</li> </ul> <p>For the items included in the sample the Auditor also verified that:</p> <ul style="list-style-type: none"> <li>○ the Beneficiary ensured best value for money (key elements to appreciate the respect of this principle are the award of the contract to the bid offering best price-quality ratio, under conditions of transparency and equal treatment. In case an existing framework contract was used the Auditor also verified that the Beneficiary ensured it was established on the basis of the principle of best value for money under conditions of transparency and equal treatment);</li> </ul> <p><i>SUCH GOODS AND SERVICES INCLUDE, FOR INSTANCE, CONSUMABLES AND SUPPLIES, DISSEMINATION (INCLUDING OPEN ACCESS), PROTECTION OF RESULTS, SPECIFIC EVALUATION OF THE ACTION IF IT IS REQUIRED BY THE AGREEMENT, CERTIFICATES ON THE FINANCIAL STATEMENTS IF THEY ARE REQUIRED BY THE AGREEMENT AND CERTIFICATES ON THE METHODOLOGY, TRANSLATIONS, REPRODUCTION.</i></p>	<p>57) Procurement rules, principles and guides were followed. There were documents of requests to different providers, different offers and assessment of the offers before selection of the provider in line with internal procedures and procurement rules. The purchases were made in accordance with the principle of best value for money.</p> <p><i>(When different offers were not collected the Auditor explains the reasons provided by the Beneficiary under the caption “Exceptions” of the Report. The Commission will analyse this information to evaluate whether these costs might be accepted as eligible)</i></p>	
<b>D.4</b>	<p><b>AGGREGATED CAPITALISED AND OPERATING COSTS OF RESEARCH INFRASTRUCTURE</b></p> <p>The Auditor ensured the existence of a positive ex-ante assessment (issued by the EC Services) of the cost accounting methodology of the Beneficiary allowing it to apply the guidelines on direct costing for large research infrastructures in Horizon 2020.</p>	<p>58) The costs declared as direct costs for Large Research Infrastructures (in the appropriate line of the Financial Statement) comply with the methodology described in the positive ex-ante assessment report.</p>	



	<p><b><i>In the cases that a positive ex-ante assessment has been issued (see the standard factual findings 58-59 on the next column),</i></b> The Auditor ensured that the beneficiary has applied consistently the methodology that is explained and approved in the positive ex ante assessment;</p> <p><b><i>In the cases that a positive ex-ante assessment has NOT been issued (see the standard factual findings 60 on the next column),</i></b> The Auditor verified that no costs of Large Research Infrastructure have been charged as direct costs in any costs category;</p> <p><b><i>In the cases that a draft ex-ante assessment report has been issued with recommendation for further changes (see the standard factual findings 60 on the next column),</i></b></p> <ul style="list-style-type: none"> <li>The Auditor followed the same procedure as above (when a positive ex-ante assessment has NOT yet been issued) and paid particular attention (testing reinforced) to the cost items for which the draft ex-ante assessment either rejected the inclusion as direct costs for Large Research Infrastructures or issued recommendations.</li> </ul>	59) Any difference between the methodology applied and the one positively assessed was extensively described and adjusted accordingly.	
		60) The direct costs declared were free from any indirect costs items related to the Large Research Infrastructure.	
<b>D.5</b>	<p><b>Costs of internally invoiced goods and services</b></p> <p><b>The Auditor sampled cost items selected randomly</b> (full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest).</p> <p>To confirm standard factual findings 61-65 listed in the next column, the Auditor:</p> <ul style="list-style-type: none"> <li>obtained a description of the Beneficiary's usual cost accounting practice to calculate costs of internally invoiced goods and services (unit costs);</li> <li>reviewed whether the Beneficiary's usual cost accounting practice was applied for the Financial Statements subject of the present CFS;</li> <li>ensured that the methodology to calculate unit costs is being used in a consistent manner, based on objective criteria, regardless of the source of funding;</li> <li>verified that any ineligible items or any costs claimed under other budget categories, in particular indirect costs, have not been taken into account when calculating the costs of</li> </ul>	61) The costs of internally invoiced goods and services included in the Financial Statement were calculated in accordance with the Beneficiary's usual cost accounting practice.	
		62) The cost accounting practices used to calculate the costs of internally invoiced goods and services were applied by the Beneficiary in a consistent manner based on objective criteria regardless of the source of funding.	
		63) The unit cost is calculated using the actual costs for the good or service recorded in the Beneficiary's accounts, excluding any ineligible cost or costs included in other	

	<p>internally invoiced goods and services (see Article 6 GA);</p> <ul style="list-style-type: none"> <li>o verified whether actual costs of internally invoiced goods and services were adjusted on the basis of budgeted or estimated elements and, if so, verified whether those elements used are actually relevant for the calculation, and correspond to objective and verifiable information.</li> <li>o verified that any costs of items which are not directly linked to the production of the invoiced goods or service (e.g. supporting services like cleaning, general accountancy, administrative support, etc. not directly used for production of the good or service) have not been taken into account when calculating the costs of internally invoiced goods and services.</li> <li>o verified that any costs of items used for calculating the costs internally invoiced goods and services are supported by audit evidence and registered in the accounts.</li> </ul>	budget categories.	
		64) The unit cost excludes any costs of items which are not directly linked to the production of the invoiced goods or service.	
		65) The costs items used for calculating the actual costs of internally invoiced goods and services were relevant, reasonable and correspond to objective and verifiable information.	
<b>E</b>	<b>USE OF EXCHANGE RATES</b>		
<b>E.1</b>	<p><u>a) For Beneficiaries with accounts established in a currency other than euros</u></p> <p><b>The Auditor sampled [ ] cost items selected randomly and verified that the exchange rates used for converting other currencies into euros were in accordance with the following rules established in the Agreement ( full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest):</b></p> <p><i>COSTS RECORDED IN THE ACCOUNTS IN A CURRENCY OTHER THAN EURO SHALL BE CONVERTED INTO EURO AT THE AVERAGE OF THE DAILY EXCHANGE RATES PUBLISHED IN THE C SERIES OF OFFICIAL JOURNAL OF THE EUROPEAN UNION (<a href="https://www.ecb.int/stats/exchange/eurofxref/html/index.en.html">https://www.ecb.int/stats/exchange/eurofxref/html/index.en.html</a> ), DETERMINED OVER THE CORRESPONDING REPORTING PERIOD.</i></p> <p><i>IF NO DAILY EURO EXCHANGE RATE IS PUBLISHED IN THE OFFICIAL JOURNAL OF THE EUROPEAN UNION FOR THE CURRENCY IN QUESTION, CONVERSION SHALL BE MADE AT THE AVERAGE OF THE MONTHLY ACCOUNTING RATES ESTABLISHED BY THE COMMISSION AND PUBLISHED ON ITS WEBSITE (<a href="http://ec.europa.eu/budget/contracts_grants/info_contracts/inforeuro/inforeuro_en.cfm">http://ec.europa.eu/budget/contracts_grants/info_contracts/inforeuro/inforeuro_en.cfm</a> ),</i></p>	66) The exchange rates used to convert other currencies into Euros were in accordance with the rules established of the Grant Agreement and there was no difference in the final figures.	

	DETERMINED OVER THE CORRESPONDING REPORTING PERIOD.		
	<p>b) For Beneficiaries with accounts established in euros</p> <p><b>The Auditor sampled [ ] cost items selected randomly and verified that the exchange rates used for converting other currencies into euros were in accordance with the following rules established in the Agreement</b> ( full coverage is required if there are fewer than 10 items, otherwise the sample should have a minimum of 10 item, or 10% of the total, whichever number is highest):</p> <p><i>COSTS INCURRED IN ANOTHER CURRENCY SHALL BE CONVERTED INTO EURO BY APPLYING THE BENEFICIARY'S USUAL ACCOUNTING PRACTICES.</i></p>	67) The Beneficiary applied its usual accounting practices.	

[legal name of the audit firm]

[name and function of an authorised representative]

[dd Month yyyy]

<Signature of the Auditor>



## ANNEX 6

### MODEL FOR THE CERTIFICATE ON THE METHODOLOGY

- For options [*in italics in square brackets*]: choose the applicable option. Options not chosen should be deleted.
- For fields in [grey in square brackets]: enter the appropriate data.

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TERMS OF REFERENCE FOR AN AUDIT ENGAGEMENT FOR A METHODOLOGY CERTIFICATE IN CONNECTION WITH ONE OR MORE GRANT AGREEMENTS FINANCED UNDER THE HORIZON 2020 RESEARCH AND INNOVATION FRAMEWORK PROGRAMME

INDEPENDENT REPORT OF FACTUAL FINDINGS ON THE METHODOLOGY CONCERNING GRANT AGREEMENTS FINANCED UNDER THE HORIZON 2020 RESEARCH AND INNOVATION FRAMEWORK PROGRAMME

**Terms of reference for an audit engagement for a methodology certificate  
in connection with one or more grant agreements financed  
under the Horizon 2020 Research and Innovation Framework Programme**

This document sets out the ‘**Terms of Reference (ToR)**’ under which

*[OPTION 1: [insert name of the beneficiary] (‘the Beneficiary’)] [OPTION 2: [insert name of the linked third party] (‘the Linked Third Party’), third party linked to the Beneficiary [insert name of the beneficiary] (‘the Beneficiary’)]*

agrees to engage

**[insert legal name of the auditor]** (‘the Auditor’)

to produce an independent report of factual findings (‘the Report’) concerning the *[Beneficiary’s]* *[Linked Third Party’s]* usual accounting practices for calculating and claiming direct personnel costs declared as unit costs (‘the Methodology’) in connection with grant agreements financed under the Horizon 2020 Research and Innovation Framework Programme.

The procedures to be carried out for the assessment of the methodology will be based on the grant agreement(s) detailed below:

**[title and number of the grant agreement(s)]** (‘the Agreement(s)’)

The Agreement(s) has(have) been concluded between the Beneficiary and *[OPTION 1: the European Union, represented by the European Commission (‘the Commission’)] [OPTION 2: the European Atomic Energy Community (Euratom,) represented by the European Commission (‘the Commission’)] [OPTION 3: the [Research Executive Agency (REA)] [European Research Council Executive Agency (ERCEA)] [Innovation and Networks Executive Agency (INEA)] [Executive Agency for Small and Medium-sized Enterprises (EASME)] (‘the Agency’), under the powers delegated by the European Commission (‘the Commission’)].*

The *[Commission]* *[Agency]* is mentioned as a signatory of the Agreement with the Beneficiary only. The *[European Union]* *[Euratom]* *[Agency]* is not a party to this engagement.

### **1.1 Subject of the engagement**

According to Article 18.1.2 of the Agreement, beneficiaries *[and linked third parties]* that declare direct personnel costs as unit costs calculated in accordance with their usual cost accounting practices may submit to the *[Commission]* *[Agency]*, for approval, a certificate on the methodology (‘CoMUC’) stating that there are adequate records and documentation to prove that their cost accounting practices used comply with the conditions set out in Point A of Article 6.2.

The subject of this engagement is the CoMUC which is composed of two separate documents:

- the Terms of Reference (‘the ToR’) to be signed by the *[Beneficiary]* *[Linked Third Party]* and the Auditor;
- the Auditor’s Independent Report of Factual Findings (‘the Report’) issued on the Auditor’s letterhead, dated, stamped and signed by the Auditor which includes; the standard statements (‘the Statements’) evaluated and signed by the *[Beneficiary]* *[Linked Third Party]*, the agreed-upon procedures (‘the Procedures’) performed by the Auditor and the standard factual findings

(‘the Findings’) assessed by the Auditor. The Statements, Procedures and Findings are summarised in the table that forms part of the Report.

The information provided through the Statements, the Procedures and the Findings will enable the Commission to draw conclusions regarding the existence of the *[Beneficiary’s] [Linked Third Party’s]* usual cost accounting practice and its suitability to ensure that direct personnel costs claimed on that basis comply with the provisions of the Agreement. The Commission draws its own conclusions from the Report and any additional information it may require.

## 1.2 Responsibilities

The parties to this agreement are the *[Beneficiary] [Linked Third Party]* and the Auditor.

The *[Beneficiary] [Linked Third Party]*:

- is responsible for preparing financial statements for the Agreement(s) (‘the Financial Statements’) in compliance with those Agreements;
- is responsible for providing the Financial Statement(s) to the Auditor and enabling the Auditor to reconcile them with the *[Beneficiary’s] [Linked Third Party’s]* accounting and bookkeeping system and the underlying accounts and records. The Financial Statement(s) will be used as a basis for the procedures which the Auditor will carry out under this ToR;
- is responsible for its Methodology and liable for the accuracy of the Financial Statement(s);
- is responsible for endorsing or refuting the Statements indicated under the heading ‘Statements to be made by the Beneficiary/ Linked Third Party’ in the first column of the table that forms part of the Report;
- must provide the Auditor with a signed and dated representation letter;
- accepts that the ability of the Auditor to carry out the Procedures effectively depends upon the *[Beneficiary] [Linked Third Party]* providing full and free access to the *[Beneficiary’s] [Linked Third Party’s]* staff and to its accounting and other relevant records.

The Auditor:

- *[Option 1 by default: is qualified to carry out statutory audits of accounting documents in accordance with Directive 2006/43/EC of the European Parliament and of the Council of 17 May 2006 on statutory audits of annual accounts and consolidated accounts, amending Council Directives 78/660/EEC and 83/349/EEC and repealing Council Directive 84/253/EEC or similar national regulations].*
- *[Option 2 if the Beneficiary or Linked Third Party has an independent Public Officer: is a competent and independent Public Officer for which the relevant national authorities have established the legal capacity to audit the Beneficiary].*
- *[Option 3 if the Beneficiary or Linked Third Party is an international organisation: is an [internal] [external] auditor in accordance with the internal financial regulations and procedures of the international organisation].*

The Auditor:

- must be independent from the Beneficiary *[and the Linked Third Party]*, in particular, it must not have been involved in preparing the Beneficiary’s *[and Linked Third Party’s]* Financial Statement(s);
- must plan work so that the Procedures may be carried out and the Findings may be assessed;
- must adhere to the Procedures laid down and the compulsory report format;
- must carry out the engagement in accordance with these ToR;
- must document matters which are important to support the Report;
- must base its Report on the evidence gathered;
- must submit the Report to the *[Beneficiary] [Linked Third Party]*.

The Commission sets out the Procedures to be carried out and the Findings to be endorsed by the Auditor. The Auditor is not responsible for their suitability or pertinence. As this engagement is not an assurance engagement the Auditor does not provide an audit opinion or a statement of assurance.

### 1.3 Applicable Standards

The Auditor must comply with these Terms of Reference and with<sup>1</sup>:

- the International Standard on Related Services ('ISRS') 4400 *Engagements to perform Agreed-upon Procedures regarding Financial Information* as issued by the International Auditing and Assurance Standards Board (IAASB);
- the *Code of Ethics for Professional Accountants* issued by the International Ethics Standards Board for Accountants (IESBA). Although ISRS 4400 states that independence is not a requirement for engagements to carry out agreed-upon procedures, the Commission requires that the Auditor also complies with the Code's independence requirements.

The Auditor's Report must state that there was no conflict of interests in establishing this Report between the Auditor and the Beneficiary *[and the Linked Third Party]* that could have a bearing on the Report, and must specify – if the service is invoiced - the total fee paid to the Auditor for providing the Report.

### 1.4 Reporting

The Report must be written in the language of the Agreement (see Article 20.7 of the Agreement).

Under Article 22 of the Agreement, the Commission, *[the Agency]*, the European Anti-Fraud Office and the Court of Auditors have the right to audit any work that is carried out under the action and for which costs are declared from *[the European Union]* *[Euratom]* budget. This includes work related to this engagement. The Auditor must provide access to all working papers related to this assignment if the Commission<sup>1</sup>, *the Agency*, the European Anti-Fraud Office or the European Court of Auditors requests them.

### 1.5 Timing

The Report must be provided by [dd Month yyyy].

### 1.6 Other Terms

*[The [Beneficiary] [Linked Third Party] and the Auditor can use this section to agree other specific terms, such as the Auditor's fees, liability, applicable law, etc. Those specific terms must not contradict the terms specified above.]*

[legal name of the Auditor]  
[name & title of authorised representative]  
[dd Month yyyy]  
Signature of the Auditor

[legal name of the [Beneficiary] [Linked Third Party]]  
[name & title of authorised representative]  
[dd Month yyyy]  
Signature of the *[Beneficiary]* *[Linked Third Party]*

<sup>1</sup> Supreme Audit Institutions applying INTOSAI-standards may carry out the Procedures according to the corresponding International Standards of Supreme Audit Institutions and code of ethics issued by INTOSAI instead of the International Standard on Related Services ('ISRS') 4400 and the Code of Ethics for Professional Accountants issued by the IAASB and the IESBA.



## **Independent report of factual findings on the methodology concerning grant agreements financed under the Horizon 2020 Research and Innovation Framework Programme**

*(To be printed on letterhead paper of the auditor)*

To

[ name of contact person(s)], [Position]  
[[Beneficiary's] [Linked Third Party's] name]  
[ Address]  
[ dd Month yyyy]

Dear [Name of contact person(s)],

As agreed under the terms of reference dated [dd Month yyyy]

with [OPTION 1: [insert name of the beneficiary] ('the Beneficiary')] [OPTION 2: [insert name of the linked third party] ('the Linked Third Party'), third party linked to the Beneficiary [insert name of the beneficiary] ('the Beneficiary')],

we

[ name of the auditor] ('the Auditor'),

established at

[full address/city/state/province/country],

represented by

[name and function of an authorised representative],

have carried out the agreed-upon procedures ('the Procedures') and provide hereby our Independent Report of Factual Findings ('the Report'), concerning the [Beneficiary's] [Linked Third Party's] usual accounting practices for calculating and declaring direct personnel costs declared as unit costs ('the Methodology').

You requested certain procedures to be carried out in connection with the grant(s)

[title and number of the grant agreement(s)] ('the Agreement(s)').

### **The Report**

Our engagement was carried out in accordance with the terms of reference ('the ToR') appended to this Report. The Report includes: the standard statements ('the Statements') made by the [Beneficiary] [Linked Third Party], the agreed-upon procedures ('the Procedures') carried out and the standard factual findings ('the Findings') confirmed by us.

The engagement involved carrying out the Procedures and assessing the Findings and the documentation requested appended to this Report, the results of which the Commission uses to draw conclusions regarding the acceptability of the Methodology applied by the [Beneficiary] [Linked Third Party].

The Report covers the methodology used from [dd Month yyyy]. In the event that the [Beneficiary] [Linked Third Party] changes this methodology, the Report will not be applicable to any Financial Statement<sup>1</sup> submitted thereafter.

The scope of the Procedures and the definition of the standard statements and findings were determined solely by the Commission. Therefore, the Auditor is not responsible for their suitability or pertinence.

Since the Procedures carried out constitute neither an audit nor a review made in accordance with International Standards on Auditing or International Standards on Review Engagements, we do not give a statement of assurance on the costs declared on the basis of the [Beneficiary's] [Linked Third Party's] Methodology. Had we carried out additional procedures or had we performed an audit or review in accordance with these standards, other matters might have come to its attention and would have been included in the Report.

### Exceptions

Apart from the exceptions listed below, the [Beneficiary] [Linked Third Party] agreed with the standard Statements and provided the Auditor all the documentation and accounting information needed by the Auditor to carry out the requested Procedures and corroborate the standard Findings.

**List here any exception and add any information on the cause and possible consequences of each exception, if known. If the exception is quantifiable, also indicate the corresponding amount.**

.....

*Explanation of possible exceptions in the form of examples (to be removed from the Report):*

- i. the [Beneficiary] [Linked Third Party] did not agree with the standard Statement number ... because...;
- ii. the Auditor could not carry out the procedure ... established because .... (e.g. due to the inability to reconcile key information or the unavailability or inconsistency of data);
- iii. the Auditor could not confirm or corroborate the standard Finding number ... because ....

### Remarks

We would like to add the following remarks relevant for the proper understanding of the Methodology applied by the [Beneficiary] [Linked Third Party] or the results reported:

*Example (to be removed from the Report):*

*Regarding the methodology applied to calculate hourly rates ...*

*Regarding standard Finding 15 it has to be noted that ...*

*The [Beneficiary] [Linked Third Party] explained the deviation from the benchmark statement XXIV concerning time recording for personnel with no exclusive dedication to the action in the following manner:*

...

### Annexes

Please provide the following documents to the auditor and annex them to the report when submitting this CoMUC to the Commission:

<sup>1</sup> Financial Statement in this context refers solely to Annex 4 of the Agreement by which the Beneficiary declares costs under the Agreement.

1. Brief description of the methodology for calculating personnel costs, productive hours and hourly rates;
2. Brief description of the time recording system in place;
3. An example of the time records used by the [Beneficiary] [Linked Third Party];
4. Description of any budgeted or estimated elements applied, together with an explanation as to why they are relevant for calculating the personnel costs and how they are based on objective and verifiable information;
5. A summary sheet with the hourly rate for direct personnel declared by the [Beneficiary] [Linked Third Party] and recalculated by the Auditor for each staff member included in the sample (the names do not need to be reported);
6. A comparative table summarising for each person selected in the sample a) the time claimed by the [Beneficiary] [Linked Third Party] in the Financial Statement(s) and b) the time according to the time record verified by the Auditor;
7. A copy of the letter of representation provided to the Auditor.

### Use of this Report

This Report has been drawn up solely for the purpose given under Point 1.1 Reasons for the engagement.

#### The Report:

- is confidential and is intended to be submitted to the Commission by the [Beneficiary] [Linked Third Party] in connection with Article 18.1.2 of the Agreement;
- may not be used by the [Beneficiary] [Linked Third Party] or by the Commission for any other purpose, nor distributed to any other parties;
- may be disclosed by the Commission only to authorised parties, in particular the European Anti-Fraud Office (OLAF) and the European Court of Auditors.
- relates only to the usual cost accounting practices specified above and does not constitute a report on the Financial Statements of the [Beneficiary] [Linked Third Party].

No conflict of interest<sup>2</sup> exists between the Auditor and the Beneficiary [and the Linked Third Party] that could have a bearing on the Report. The total fee paid to the Auditor for producing the Report was EUR [ ] (including EUR [ ] of deductible VAT).

We look forward to discussing our Report with you and would be pleased to provide any further information or assistance which may be required.

Yours sincerely

[legal name of the Auditor]

[name and title of the authorised representative]

[dd Month yyyy]

Signature of the Auditor

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<sup>2</sup> A conflict of interest arises when the Auditor's objectivity to establish the certificate is compromised in fact or in appearance when the Auditor for instance:

- was involved in the preparation of the Financial Statements;
- stands to benefit directly should the certificate be accepted;
- has a close relationship with any person representing the beneficiary;
- is a director, trustee or partner of the beneficiary; or
- is in any other situation that compromises his or her independence or ability to establish the certificate impartially.

**Statements to be made by the Beneficiary/Linked Third Party ('the Statements') and Procedures to be carried out by the Auditor ('the Procedures') and standard factual findings ('the Findings') to be confirmed by the Auditor**

The Commission reserves the right to provide the auditor with guidance regarding the Statements to be made, the Procedures to be carried out or the Findings to be ascertained and the way in which to present them. The Commission reserves the right to vary the Statements, Procedures or Findings by written notification to the Beneficiary/Linked Third Party to adapt the procedures to changes in the grant agreement(s) or to any other circumstances.

If this methodology certificate relates to the Linked Third Party's usual accounting practices for calculating and claiming direct personnel costs declared as unit costs any reference here below to 'the Beneficiary' is to be considered as a reference to 'the Linked Third Party'.

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
<p><b>A. Use of the Methodology</b></p> <p>I. The cost accounting practice described below has been in use since /dd Month yyyy/.</p> <p>II. The next planned alteration to the methodology used by the Beneficiary will be from [dd Month yyyy/.</p>	<p><b>Procedure:</b></p> <p>✓ The Auditor checked these dates against the documentation the Beneficiary has provided.</p> <p><b>Factual finding:</b></p> <p>1. The dates provided by the Beneficiary were consistent with the documentation.</p>
<p><b>B. Description of the Methodology</b></p> <p>III. The methodology to calculate unit costs is being used in a consistent manner and is reflected in the relevant procedures.</p> <p><i>[Please describe the methodology your entity uses to calculate <u>personnel costs</u>, productive hours and hourly rates, present your description to the Auditor and annex it to this certificate]</i></p> <p><i>[If the statement of section "B. Description of the methodology" cannot be endorsed by the Beneficiary or there is no written methodology to calculate unit costs it should be listed here below and reported as exception by the Auditor in the main Report of Factual Findings:</i></p> <p>- ...]</p>	<p><b>Procedure:</b></p> <p>✓ The Auditor reviewed the description, the relevant manuals and/or internal guidance documents describing the methodology.</p> <p><b>Factual finding:</b></p> <p>2. The brief description was consistent with the relevant manuals, internal guidance and/or other documentary evidence the Auditor has reviewed.</p> <p>3. The methodology was generally applied by the Beneficiary as part of its usual costs accounting practices.</p>

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
<p><b>C. Personnel costs</b></p> <p><u>General</u></p> <p>IV. The unit costs (hourly rates) are limited to salaries including during parental leave, social security contributions, taxes and other costs included in the remuneration required under national law and the employment contract or equivalent appointing act;</p> <p>V. Employees are hired directly by the Beneficiary in accordance with national law, and work under its sole supervision and responsibility;</p> <p>VI. The Beneficiary remunerates its employees in accordance with its usual practices. This means that personnel costs are charged in line with the Beneficiary's usual payroll policy (e.g. salary policy, overtime policy, variable pay) and no special conditions exist for employees assigned to tasks relating to the European Union or Euratom, unless explicitly provided for in the grant agreement(s);</p> <p>VII. The Beneficiary allocates its employees to the relevant group/category/cost centre for the purpose of the unit cost calculation in line with the usual cost accounting practice;</p> <p>VIII. Personnel costs are based on the payroll system and accounting system.</p> <p>IX. Any exceptional adjustments of actual personnel costs resulted from relevant budgeted or estimated elements and were based on objective and verifiable information. <i>[Please describe the 'budgeted or estimated elements' and their relevance to personnel costs, and explain how they were reasonable and based on objective and verifiable information, present your explanation to the Auditor and annex it to this certificate].</i></p> <p>X. Personnel costs claimed do not contain any of the following ineligible costs: costs related to return on capital; debt and debt service charges; provisions for future losses or debts; interest owed; doubtful debts; currency exchange losses; bank costs charged by the Beneficiary's bank for transfers from the Commission/Agency; excessive or reckless expenditure; deductible VAT or costs incurred during suspension of the implementation of the action.</p> <p>XI. Personnel costs were not declared under another EU or Euratom grant</p>	<p><b>Procedure:</b></p> <p><i>The Auditor draws a sample of employees to carry out the procedures indicated in this section C and the following sections D to F.</i>  <i>[The Auditor has drawn a random sample of 10 employees assigned to Horizon 2020 action(s). If fewer than 10 employees are assigned to the Horizon 2020 action(s), the Auditor has selected all employees assigned to the Horizon 2020 action(s) complemented by other employees irrespective of their assignments until he has reached 10 employees.].</i> For this sample:</p> <ul style="list-style-type: none"> <li>✓ the Auditor reviewed all documents relating to personnel costs such as employment contracts, payslips, payroll policy (e.g. salary policy, overtime policy, variable pay policy), accounting and payroll records, applicable national tax, labour and social security law and any other documents corroborating the personnel costs claimed;</li> <li>✓ in particular, the Auditor reviewed the employment contracts of the employees in the sample to verify that: <ul style="list-style-type: none"> <li>i. they were employed directly by the Beneficiary in accordance with applicable national legislation;</li> <li>ii. they were working under the sole technical supervision and responsibility of the latter;</li> <li>iii. they were remunerated in accordance with the Beneficiary's usual practices;</li> <li>iv. they were allocated to the correct group/category/cost centre for the purposes of calculating the unit cost in line with the Beneficiary's usual cost accounting practices;</li> </ul> </li> <li>✓ the Auditor verified that any ineligible items or any costs claimed under other costs categories or costs covered by other types of grant or by other grants financed from the European Union budget have not been taken into account when calculating the personnel costs;</li> <li>✓ the Auditor numerically reconciled the total amount of personnel costs used to calculate the unit cost with the total amount of personnel costs recorded in the statutory accounts and the payroll system.</li> </ul>

<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
<p>(including grants awarded by a Member State and financed by the EU budget and grants awarded by bodies other than the Commission/Agency for the purpose of implementing the EU or Euratom budget in the same period, unless the Beneficiary can demonstrate that the operating grant does not cover any costs of the action).</p> <p><u>If additional remuneration as referred to in the grant agreement(s) is paid</u></p> <p>XII. The Beneficiary is a non-profit legal entity;</p> <p>XIII. The additional remuneration is part of the beneficiary's usual remuneration practices and paid consistently whenever the relevant work or expertise is required;</p> <p>XIV. The criteria used to calculate the additional remuneration are objective and generally applied regardless of the source of funding;</p> <p>XV. The additional remuneration included in the personnel costs used to calculate the hourly rates for the grant agreement(s) is capped at EUR 8 000 per full-time equivalent (reduced proportionately if the employee is not assigned exclusively to the action).</p> <p><i>[If certain statement(s) of section "C. Personnel costs" cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor in the main Report of Factual Findings:</i></p> <p>- ...]</p>	<p>✓ to the extent that actual personnel costs were adjusted on the basis of budgeted or estimated elements, the Auditor carefully examined those elements and checked the information source to confirm that they correspond to objective and verifiable information;</p> <p>✓ if additional remuneration has been claimed, the Auditor verified that the Beneficiary was a non-profit legal entity, that the amount was capped at EUR 8 000 per full-time equivalent and that it was reduced proportionately for employees not assigned exclusively to the action(s).</p> <p>✓ the Auditor recalculated the personnel costs for the employees in the sample.</p> <p><b>Factual finding:</b></p> <p>4. All the components of the remuneration that have been claimed as personnel costs are supported by underlying documentation.</p> <p>5. The employees in the sample were employed directly by the Beneficiary in accordance with applicable national law and were working under its sole supervision and responsibility.</p> <p>6. Their employment contracts were in line with the Beneficiary's usual policy;</p> <p>7. Personnel costs were duly documented and consisted solely of salaries, social security contributions (pension contributions, health insurance, unemployment fund contributions, etc.), taxes and other statutory costs included in the remuneration (holiday pay, thirteenth month's pay, etc.);</p> <p>8. The totals used to calculate the personnel unit costs are consistent with those registered in the payroll and accounting records;</p> <p>9. To the extent that actual personnel costs were adjusted on the basis of budgeted or estimated elements, those elements were relevant for calculating the personnel costs and correspond to objective and verifiable information. The budgeted or estimated elements used are: — (indicate the elements and their values).</p> <p>10. Personnel costs contained no ineligible elements;</p> <p>11. Specific conditions for eligibility were fulfilled when additional</p>



<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
	remuneration was paid: a) the Beneficiary is registered in the grant agreements as a non-profit legal entity; b) it was paid according to objective criteria generally applied regardless of the source of funding used and c) remuneration was capped at EUR 8000 per full-time equivalent (or up to up to the equivalent pro-rata amount if the person did not work on the action full-time during the year or did not work exclusively on the action).
<p><b>D. Productive hours</b></p> <p>XVI. The number of productive hours per full-time employee applied is <i>[delete as appropriate]</i>:</p> <p>A. 1720 productive hours per year for a person working full-time (corresponding pro-rata for persons not working full time).</p> <p>B. the total number of hours worked in the year by a person for the Beneficiary</p> <p>C. the standard number of annual hours generally applied by the beneficiary for its personnel in accordance with its usual cost accounting practices. This number must be at least 90% of the standard annual workable hours.</p> <p><u>If method B is applied</u></p> <p>XVII. The calculation of the total number of hours worked was done as follows: annual workable hours of the person according to the employment contract, applicable labour agreement or national law plus overtime worked minus absences (such as sick leave and special leave).</p> <p>XVIII. ‘Annual workable hours’ are hours during which the personnel must be working, at the employer’s disposal and carrying out his/her activity or duties under the employment contract, applicable collective labour agreement or national working time legislation.</p> <p>XIX. The contract (applicable collective labour agreement or national working time legislation) do specify the working time enabling to calculate the annual workable hours.</p>	<p><b>Procedure (same sample basis as for Section C: Personnel costs):</b></p> <ul style="list-style-type: none"> <li>✓ The Auditor verified that the number of productive hours applied is in accordance with method A, B or C.</li> <li>✓ The Auditor checked that the number of productive hours per full-time employee is correct.</li> <li>✓ If method B is applied the Auditor verified i) the manner in which the total number of hours worked was done and ii) that the contract specified the annual workable hours by inspecting all the relevant documents, national legislation, labour agreements and contracts.</li> <li>✓ If method C is applied the Auditor reviewed the manner in which the standard number of working hours per year has been calculated by inspecting all the relevant documents, national legislation, labour agreements and contracts and verified that the number of productive hours per year used for these calculations was at least 90% of the standard number of working hours per year.</li> </ul> <p><b>Factual finding:</b></p> <p><u>General</u></p> <p>12. The Beneficiary applied a number of productive hours consistent with method A, B or C detailed in the left-hand column.</p> <p>13. The number of productive hours per year per full-time employee was accurate.</p> <p><u>If method B is applied</u></p> <p>14. The number of ‘annual workable hours’, overtime and absences was</p>



<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
<p><u>If method C is applied</u></p> <p>XX. The standard number of productive hours per year is that of a full-time equivalent.</p> <p>XXI. The number of productive hours per year on which the hourly rate is based i) corresponds to the Beneficiary's usual accounting practices; ii) is at least 90 % of the standard number of workable (working) hours per year.</p> <p>XXII. Standard workable (working) hours are hours during which personnel are at the Beneficiary's disposal performing the duties described in the relevant employment contract, collective labour agreement or national labour legislation. The number of standard annual workable (working) hours that the Beneficiary claims is supported by labour contracts, national legislation and other documentary evidence.</p> <p><i>[If certain statement(s) of section "D. Productive hours" cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor:</i> - ...]</p>	<p>verifiable based on the documents provided by the Beneficiary and the calculation of the total number of hours worked was accurate.</p> <p>15. The contract specified the working time enabling to calculate the annual workable hours.</p> <p><u>If method C is applied</u></p> <p>16. The calculation of the number of productive hours per year corresponded to the usual costs accounting practice of the Beneficiary.</p> <p>17. The calculation of the standard number of workable (working) hours per year was corroborated by the documents presented by the Beneficiary.</p> <p>18. The number of productive hours per year used for the calculation of the hourly rate was at least 90 % of the number of workable (working) hours per year.</p>
<p><b>E. Hourly rates</b></p> <p>The hourly rates are correct because:</p> <p>XXIII. Hourly rates are correctly calculated since they result from dividing annual personnel costs by the productive hours of a given year and group (e.g. staff category or department or cost centre depending on the methodology applied) and they are in line with the statements made in section C. and D. above.</p> <p><i>[If the statement of section 'E. Hourly rates' cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor:</i> - ...]</p>	<p><b>Procedure</b></p> <ul style="list-style-type: none"> <li>✓ The Auditor has obtained a list of all personnel rates calculated by the Beneficiary in accordance with the methodology used.</li> <li>✓ The Auditor has obtained a list of all the relevant employees, based on which the personnel rate(s) are calculated.</li> </ul> <p>For 10 employees selected at random (same sample basis as Section C: Personnel costs):</p> <ul style="list-style-type: none"> <li>✓ The Auditor recalculated the hourly rates.</li> <li>✓ The Auditor verified that the methodology applied corresponds to the usual accounting practices of the organisation and is applied consistently for all activities of the organisation on the basis of objective criteria irrespective of the source of funding.</li> </ul> <p><b>Factual finding:</b></p>

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	19. No differences arose from the recalculation of the hourly rate for the employees included in the sample.
<p><b>F. Time recording</b></p> <p>XXIV. Time recording is in place for all persons with no exclusive dedication to one Horizon 2020 action. At least all hours worked in connection with the grant agreement(s) are registered on a <b>daily/weekly/monthly</b> basis <i>[delete as appropriate]</i> using a <b>paper/computer-based system</b> <i>[delete as appropriate]</i>;</p> <p>XXV. For persons exclusively assigned to one Horizon 2020 activity the Beneficiary has either signed a declaration to that effect or has put arrangements in place to record their working time;</p> <p>XXVI. Records of time worked have been signed by the person concerned (on paper or electronically) and approved by the action manager or line manager at least monthly;</p> <p>XXVII. Measures are in place to prevent staff from:</p> <ol style="list-style-type: none"> <li>recording the same hours twice,</li> <li>recording working hours during absence periods (e.g. holidays, sick leave),</li> <li>recording more than the number of productive hours per year used to calculate the hourly rates, and</li> <li>recording hours worked outside the action period.</li> </ol> <p>XXVIII. No working time was recorded outside the action period;</p> <p>XXIX. No more hours were claimed than the productive hours used to calculate the hourly personnel rates.</p> <p><i>[Please provide a brief description of the <u>time recording system</u> in place together with the measures applied to ensure its reliability to the Auditor and annex it to the</i></p>	<p><b>Procedure</b></p> <ul style="list-style-type: none"> <li>✓ The Auditor reviewed the brief description, all relevant manuals and/or internal guidance describing the methodology used to record time.</li> </ul> <p>The Auditor reviewed the time records of the random sample of 10 employees referred to under Section C: Personnel costs, and verified in particular:</p> <ul style="list-style-type: none"> <li>✓ that time records were available for all persons with not exclusive assignment to the action;</li> <li>✓ that time records were available for persons working exclusively for a Horizon 2020 action, or, alternatively, that a declaration signed by the Beneficiary was available for them certifying that they were working exclusively for a Horizon 2020 action;</li> <li>✓ that time records were signed and approved in due time and that all minimum requirements were fulfilled;</li> <li>✓ that the persons worked for the action in the periods claimed;</li> <li>✓ that no more hours were claimed than the productive hours used to calculate the hourly personnel rates;</li> <li>✓ that internal controls were in place to prevent that time is recorded twice, during absences for holidays or sick leave; that more hours are claimed per person per year for Horizon 2020 actions than the number of productive hours per year used to calculate the hourly rates; that working time is recorded outside the action period;</li> <li>✓ the Auditor cross-checked the information with human-resources records to verify consistency and to ensure that the internal controls have been effective. In addition, the Auditor has verified that no more hours were charged to Horizon 2020 actions per person per year than the number of productive hours per year used to calculate the hourly rates, and verified that</li> </ul>

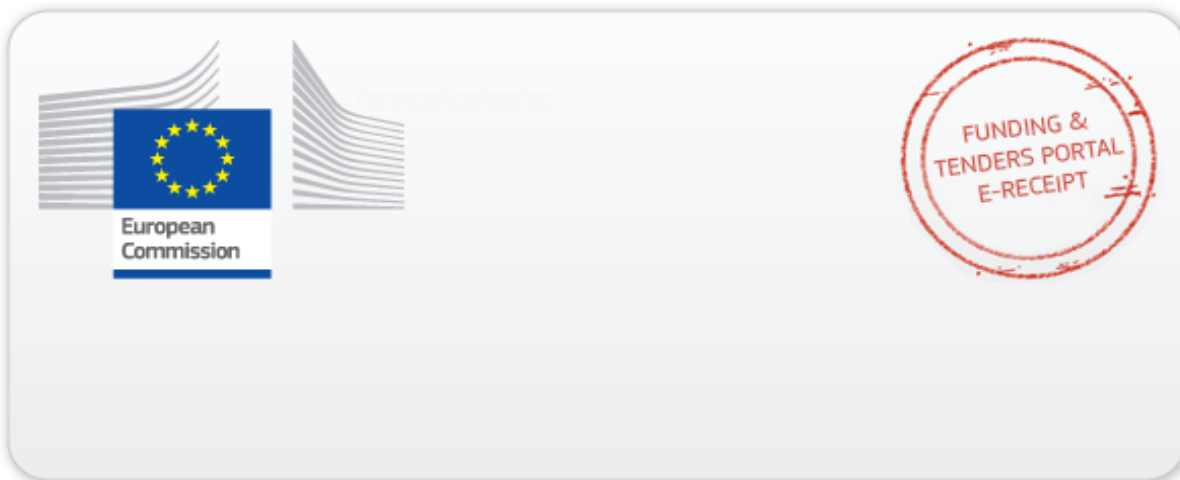
<i>Please explain any discrepancies in the body of the Report.</i>	
Statements to be made by Beneficiary	Procedures to be carried out and Findings to be confirmed by the Auditor
<p><i>present certificate<sup>1</sup>].</i></p> <p><i>[If certain statement(s) of section “F. Time recording” cannot be endorsed by the Beneficiary they should be listed here below and reported as exception by the Auditor: - ...]</i></p>	<p>no time worked outside the action period was charged to the action.</p> <p><b>Factual finding:</b></p> <ol style="list-style-type: none"> <li>20. The brief description, manuals and/or internal guidance on time recording provided by the Beneficiary were consistent with management reports/records and other documents reviewed and were generally applied by the Beneficiary to produce the financial statements.</li> <li>21. For the random sample time was recorded or, in the case of employees working exclusively for the action, either a signed declaration or time records were available;</li> <li>22. For the random sample the time records were signed by the employee and the action manager/line manager, at least monthly.</li> <li>23. Working time claimed for the action occurred in the periods claimed;</li> <li>24. No more hours were claimed than the number productive hours used to calculate the hourly personnel rates;</li> <li>25. There is proof that the Beneficiary has checked that working time has not been claimed twice, that it is consistent with absence records and the number of productive hours per year, and that no working time has been claimed outside the action period.</li> <li>26. Working time claimed is consistent with that on record at the human-resources department.</li> </ol>

<sup>1</sup> The description of the time recording system must state among others information on the content of the time records, its coverage (full or action time-recording, for all personnel or only for personnel involved in H2020 actions), its degree of detail (whether there is a reference to the particular tasks accomplished), its form, periodicity of the time registration and authorisation (paper or a computer-based system; on a daily, weekly or monthly basis; signed and countersigned by whom), controls applied to prevent double-charging of time or ensure consistency with HR-records such as absences and travels as well as its information flow up to its use for the preparation of the Financial Statements.

Grant Agreement number: [insert number] [insert acronym] [insert call identifier]

H2020 Model Grant Agreements: H2020 General MGA — Multi: v5.0 – dd.mm.2017

<i>Please explain any discrepancies in the body of the Report.</i>	
<b>Statements to be made by Beneficiary</b>	<b>Procedures to be carried out and Findings to be confirmed by the Auditor</b>
<i>[official name of the [Beneficiary] [Linked Third Party]]</i>	<i>[official name of the Auditor]</i>
<i>[name and title of authorised representative]</i>	<i>[name and title of authorised representative]</i>
<i>[dd Month yyyy]</i>	<i>[dd Month yyyy]</i>
<i>&lt;Signature of the [Beneficiary] [Linked Third Party]&gt;</i>	<i>&lt;Signature of the Auditor&gt;</i>



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