



Call topic: CL3-2022-DRS-01-05, Project 101121135 (GOBEYOND)



***GeO and weather multi-risk impact Based Early warning and response systems
supporting rapid deployment of first responders in EU and beyond
(GOBEYOND)***

Annex 1 – Part B to Grant Agreement

DESCRIPTION OF THE ACTION (DoA)

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History of changes

DOA Version 1.2 versus Part B of proposal

Date: 02/06/2023

HISTORY OF CHANGES		
VERSION	PUBLICATION DATE	CHANGE
1.0	26.04.2023	Correction of typos and mistakes in cross references
		Correction of the error in the date of Workshop 3 to M46, and all its cross references.
		Following instructions from PO: reduction elimination of the Technical periodic reports as Deliverables (former D8.1, D8.2 and D8.4)
		Following instructions from PO: D3.1, D3.2 and D3.3 are separated in two different Deliverables each (instead of having a revised version)
		Correction of the mistake in the temporal end of WP5 and WP8, now both to finish in M48
1.1	22.05.2023	Updated PM of the Swiss associated partners based on their real personnel cost
		Following instructions from PO: in the table of Section 3.4.2 • Included 9- NOA, 12 POZZ, 13 EPCA and 14 EST partners • Modified number of entities according to the Annex 2 • Removed UPC's subcontracting costs
		Following instructions from PO: included in the Section 3.4.1 the following sentence "Article 6.2.B and 9.3 of the GA and its principles are applicable and respected during the selection of the subcontractor (i.a. best value for money, no conflict of interest)"
1.2	09.06.2023	- Replaced DGRN with APDN - Added DGRN as Associated Partner
		Included in section 3.3.1 Table 9: Budget table for the Associated Partners

1. Excellence

1.1. Objectives and ambition

“Early Warning Systems are only as good as the actions they catalyse. Action is an essential part of any warning system. If a warning is sounded, and no one takes the action that the warning was intended to trigger, then the warning system failed.” (IFRC, 2012).

Disaster Risk Management (DRM) cycles require the assessment of risks, crisis and preparedness for natural hazards. Thus, enhanced DRM cycle relies on tools using different types of information and forecasts (e.g., climate projections, meteorological forecasts, geohazard physical data) that can enable the anticipation of disasters to provide **Early Warnings for supporting the situational awareness and rapid deployment of responders in vulnerable areas**.

In this context, Early Warning Systems (EWS) have become a **crucial instrument for DRM**. **Now promoted by the UN through the "Early Warnings for All initiative"**, EWS can be especially critical during weather/climate emergencies. However, EWS must be able to trigger the intended actions to be undertaken by authorities, first and second responders and citizens (i.e., the **zero-order** or the earliest responders in place) for damage reduction.

However, as the **catastrophic floods of July 2021 in Germany and Belgium** exemplified (over 180 deaths in a 200 mm daily rainfall event), this is not easy to achieve. Evidently, the available scientific and technical **advancements enabling us to anticipate extreme events are not well integrated in the real-life protocols of authorities and first responders**.

Moreover, the increase in frequency and severity of extreme climate and weather events is **exacerbating climate-related economic and social losses (WMO 2021)**. Hence it is critical to **develop and implement EWSs adapted to the local needs of authorities, first responders and the population**. In this context, **Impact-based EWS (IEWS)**, and particularly Multi-Hazard Impact-based EWS (MH-IEWS) for weather emergencies have been **promoted by the WMO** and the **Sendai Framework (Target G)** as the next step to translate forecasts into information for **supporting actionable decisions during emergencies** and triggering **site-specific actions based on early risk forecasts**.

Although many initiatives try to incorporate the concept of **IEWS** for weather and climate-induced disasters, **there are very few successful experiences in implementing and demonstrating MH-IEWS in an operational environment**. The successful H2020 Innovation Action **ANYWHERE** (www.anywhere-h2020.eu), **winner of the EC Security Innovation Resilience Award in 2022**, is one of them. **ANYWHERE** developed an operational **Multi-Hazard Early Warning System** for extreme weather and climate events, able to translate the most advanced meteorological forecasts into **Impact forecasting products**, to support emergency management. The system was verified, tested and operationally demonstrated in **7 Emergency Management Centres covering the entire climatic range in the EU during more than one year** (see <http://anywhere-h2020.eu/services/multi-hazard-early-warning-platforms/a4eu/pilot-sites>). Services based on its Key Exploitable Results (KERs) are nowadays offered in several EU countries.

The present proposal **GOBEYOND** is based on the legacy of the **MH-IEWS for extreme weather events** developed in **ANYWHERE** and the services offered by the **Copernicus Emergency Management Services (CEMS)**, the **European Flood Awareness System (EFAS)**, the **European Forest Fire Information System (EFFIS)** and the **European Drought Observatory (EDO)**; as well as in other previous EU projects as **TAMIR**, **BEAWARE**, **ERICHA** and **COSPARIN from ESA-European Space Agency**.

This project aims to **Go Beyond** the present state of the art by proposing as its main objective the **development and testing of a Multi-Risk IEWS adapted to support Civil Protection Authorities (CPAs) and first responders in their situational awareness and rapid deployment during weather, climate AND geophysical emergencies, in Europe and beyond**. To achieve this main objective, the project proposes **six SPECIFIC OBJECTIVES to maximize impact (Figure 1)**.

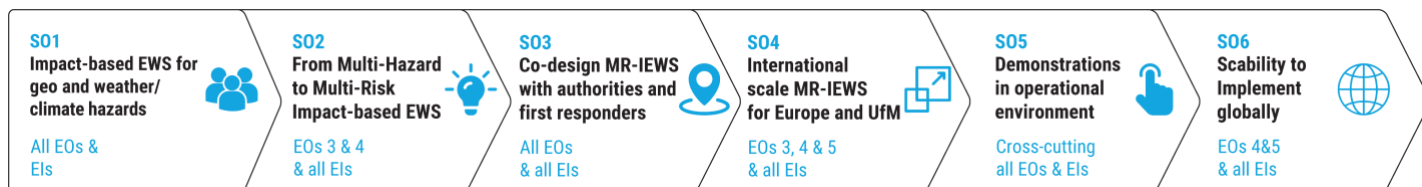


Figure 1: GOBEYOND Specific Objectives and their contribution to Topic EOs and Destination EIs (see Section 2.1.1).

They are described below together with **associated Key Performance Indicators (KPIs)**.

1.1.1. Project Specific Objectives

SO1: Extend the experience of the Impact-based EWS to geological and geophysical hazards (geohazards) based on the legacy of existing solutions in the area of extreme weather events.

A new family of **IEWS** for the most relevant geohazards (able to deal with the limitations on anticipatory capacities) in Europe and the countries of the [Union for the Mediterranean \(UfM\)](#) will be proposed. These will focus on **providing Impact-based Early Warnings to facilitate the rapid deployment of resources and first responders and improve the situational awareness of the regional and local Emergency Management Centres (EMCs)** following the lessons learnt in recent projects on **geo EWS**, in which the Consortium has participated as [TURNKey](#), [RISE](#), [QLARM](#), [SERA](#), [ESPRESSO](#)... (see **Table 2**).

To achieve **SO1**, **WP1** will identify the most innovative algorithms and methodologies available to be integrated in an **EWS** to activate and enhance the response capacity. Thus, the project will work to add the required components to convert them into Impact-based algorithms (see 1.1.2). Once ready, they will be integrated with the impact forecasting algorithms for weather events in a common **Multi-Risk IEWS processing core (WP3)**. **WP2** will co-design together with the practitioners the requirements of the system, **WP3** and **WP4** will develop the IT systems to put it in operation, and **WP5** will demonstrate in the project pilot sites the integrated geo and weather **GOBEYOND MR-IEWS platforms**.

KPIs: (i) **Deliverable D1.3:** Report on the recommended methodologies and technologies to enhance the response capacity to geo and weather events to be integrated in the **GOBEYOND** platforms; (ii) A **Multi-Risk IEWS processing core** including the impact-based EWS algorithms for geohazards (**D3.1**); (iii) Two **Multi-Risk IEWS international platforms for geo and weather events (D3.2, D3.3)**.

SO2: Convert the present MH-IEWS into Multi-Risk Impact-based EWS (MR-IEWS) able to trigger actionable decisions and supporting the reaction of the citizens through Site-Specific Warnings

This will be done capitalising on the experience of the Consortium in the operational use of **EWS** for weather and geohazards, aiming for a **real integration of the most advanced Impact-based forecasting algorithms for geo and weather events with high resolution vulnerability, exposure and risk information** at regional and local level (**WP4**). A specific effort will be made to include vulnerability and exposure layers available at EU scale (through the [DRMKC Risk Data Hub](#)) to create a **MR-IEWS European platform (EW4Europe, D3.2)**. A second international platform for the countries of the [UfM](#) will also be developed (**EW4Med, D3.3**) using the available information and coping in the best possible way with the data availability limitations.

The proposed **regional/local MR-IEWS** will include advanced capabilities as the pre-identification of most vulnerable points and activities; **advanced communication services** based on the latest developments on [Site Specific Warnings \(SSWs\)](#) and [SMS Cell Broadcast technologies](#) (SMS-CB); and capacities to **trigger actions through their integration with regional emergency and local self-protection plans** (see 1.1.2.6).

KPIs: (i) **5 MR-IEWS regional prototypes** demonstrated in **WP5**; (ii) **4 MR-IEWS local prototypes** adapted to the municipal demonstrations in **WP5**; (iii) **2 MR-IEWS international platforms: EW4Europe, and EW4MED (WP3)**; (iv) Life test on an unexpected disaster out of the pilot sites (**D5.4**); (v) **Deliverables D3.3, D4.3, D4.4, D5.3**.

SO3: Co-design with selected early-adopter authorities and first responders the MR-IEWS prototypes to ensure their integration into existing tools for decision-making and situation reporting to support emergency response at local/regional scales.

GOBEYOND aims to co-create a **new generation of innovative MR-IEWS** providing **decision support** for more efficient and rapid deployment of first responders in vulnerable areas **during extreme geo and weather disasters (WP2)**. This will be achieved through **participatory approaches to co-design, implement and co-evaluate** the tools and platforms to be developed in the project in the 6 project pilot sites. The participation as partners of **4 early-adopter municipalities** will ensure the active involvement of the key community actors in these participatory approaches.

In the 3 EU regional pilot-sites, **GOBEYOND** will make a step ahead by adapting the **Social Sciences and Humanities framework of Living-Labs (LLs)** as an incubator of innovative strategies and **robust pathways to enhance cross-disciplinary cooperation and engagement**, becoming a **key innovation strategy for the development of MR-IEWS platforms supporting the rapid deployment of first responders in affected areas** (see Section 1.1.2.5). Therefore, 3 LLs will be **implemented and demonstrated in the EU regional pilot sites** They will **boost dialogue and cooperation** among all the key actors (including scientists, IT developers, local and regional authorities, first and second responders, representative of key community associations) to participate actively **in the planning and design phases (WP2) as well as in the co-evaluation during the demonstrations (WP5)**.

The activities will include re-designing existing knowledge, methodologies and tools of previous H2020 projects, and the adaptation of the methodologies/technologies identified by **WP1**, identifying needs and specifications to ensure that the **real operational needs are taken into account through the full innovation cycle from the very beginning**. The effort will include the revision an intense use of the available innovative, and not yet fully exploited, Copernicus operational services for [Climate Change \(C3S\)](#) and [Emergency Management \(CEMS\)](#) to support the rapid

deployment of first responders in vulnerable areas.

KPIs: (i) 3 LLs implemented and demonstrated in the project EU regional pilot-sites (WP2 and WP5); (ii) at least 10 key institutions / authorities/ associations participating in the **core group of each LL**; (iii) **Deliverable D2.1**; (iv) **Deliverable D5.3: Feedback and recommendations** from pilot-site stakeholders and communities.

SO4: Develop a **European-scale MR-IEWS platform** with great specificity in time and space, **co-designed with planning authorities, civil protection agencies and first responders** to ensure its efficiency to support their rapid deployment and a **MR-IEWS platform adapted to operate in countries of the UfM**.

GOBEYOND will develop 2 **international MR-IEWS platforms**, one for the European countries (**EW4EUrope**) and a second for the **UfM** countries (**E4MED**) adapted to the real availability of data in African countries. They will serve as umbrella for the development of 5 **regional prototypes** adapted to the needs of regional Civil Protection Authorities (CPAs) and 4 **municipal prototypes for local CPAs** that will be demonstrated in the 6 **pilot sites (WP5)**. Based on these demonstrations an Innovation Plan will be prepared to offer the **GOBEYOND MR-IEWS solutions** as commercial services to any region or city of Europe and of the **UfM** space once the project is finalised (**WP6**).

KPIs: (i) **MR-IEWS European-scale platform for geo and weather events EW4EUrope (D3.2)**; (ii) **MR-IEWS platforms for the UfM countries (E4MED) (D3.3)**; (iii) **Life tests on unexpected disaster out of pilot sites (D5.4)**

SO5: Test and improve the co-designed MR-IEWS prototypes in operational environment on 6 real-time demonstrations during geo and weather events to ensure **GOBEYOND KERs reach TRL 7 to 8** at the end of the project

GOBEYOND will run 6 real-time 24/7 **OPERATIONAL DEMONSTRATIONS** during 24 Months of the project to test and improve in operational environment the developed **MR-IEWS platforms and decision support tools (WP5)** in collaboration with different types of end users (including authorities and first and second responders), see section 1.2.3. This will allow **GOBEYOND KERs to reach TRL 7 to 8** at the end of the project.

Regional and local participatory approaches (established in WP2 and working during the WP5 demonstrations) will be developed in the 6 pilot sites to ensure the proposed **MR-IEWS platforms** become a significant step-ahead to support emergency response at local/regional scales. In particular 3 LLs will be implemented in the EU regional pilot-sites, converting the **GOBEYOND platforms** into a reference of innovative **Impact-based Multi-Risk Early Warning Systems supporting the rapid deployment of first responders in vulnerable areas**. These demonstrations in operational environment together with committed practitioners will be extended beyond the EU to a Swiss Canton and the Province of Al Hoceima (Morocco) in Tasks T5.7 and T5.6. A sixth demonstration at municipal scale (T5.8) will be run in 4 EU cities, focused on testing the innovative SSWs and the advanced communication capacities, as well as their integration with local [self-protection plans](#) and protocols.

The 6 demonstrations will showcase and prove the robustness of the developments in operational environments, moving them to the technological level of being complete and qualified systems and, when possible, ready for market uptake and real-time operation (project results reaching TRL 7 to 8). Understanding that this is the best strategy to guarantee the sustainability of the systems and results beyond the end of the project.

KPIs: (i) Operational run of the decision-support tools in 6 pilot-sites demonstrations (WP5); (ii) Intensive test in operational environment of 5 **regional prototypes**; (ii) Intensive test in operational environment of 4 **municipal prototypes**; (ii) Project KERs reaching TRL 7 to 8; (iii) **D4.4** Final version of the **MR-IEWS** improved at the demonstrations ready for market uptake.

SO6: Design of **GOBEYOND MR-IEWS platforms** to facilitate their scalability at low cost and their implementation anywhere in Europe and beyond, supporting the implementation of international policy frameworks.

GOBEYOND MR-IEWS platforms will be easy to be scaled-up at low cost by design, to provide technological support to the societal transformation required to boost societal resilience in any region/municipality in Europe and beyond. This capacity will be verified through the 5 **regional demonstrations, including an UfM pilot-site demonstration** in Al Hoceima province (Morocco) (T5.6), and a **distributed municipal demonstration in 4 EU cities (T5.8)**. This capacity will have a key impact supporting the implementation of international policy frameworks for DRR particularly the [Sendai Framework DRR \(SFDRR\) Target G](#) (increase access to multi-hazard EWS), the [UN initiative Early Warnings for All](#), the [EU Climate Adaptation Strategy](#) and [HE Mission Adaptation to CC](#), the [SDGs \(11 and 13\)](#) and the global goal on adaptation in [Article 7 of the Paris Agreement](#).

Moreover, an **Adaptation Accelerator Program (WP6)** will be implemented to maximize the adoption of the **GOBEYOND MR-IEWS platforms**, and ensure future sustainability. Specific actions to showcase and discuss the results from the **GOBEYOND** demonstrations and promote adoption will be carried out in **WP7** through collaboration with the [Community of European Research and Innovation for Security \(CERIS, DG-HOME\)](#); the International Forum to Advance First Responder Innovation ([IFAFRI](#)); the [UCPM](#), [ERCC](#) and [UCPKN](#) (DG ECHO); [DRMKC](#) (DG-JRC); [Working Group F](#) (WGF-DG ENV); [Climate-ADAPT](#) (DG CLIMA); [Security Research Event](#) (DG-HOME and DG-ECHO); [UNDRR](#); [EUMETNET](#); [WMO](#); [IFAFRI](#); [IFRC](#); and the [EURADA network of RDAs](#).

KPIs: (i) **GOBEYOND MR-IEWS adapted versions** implemented and tested in **4 municipalities (T5.8)**; (ii) **An UfM pilot-site demonstration run in Morocco (T5.6)**; (iii) A **GOBEYOND platform for the UfM countries** demonstrated (**D3.3**); (iv) An **Adaptation Accelerator Program** implemented before the end of the project (**D6.3**); (v) A **Community of Practice (CoP)** with >50 stakeholder institutions and civil society organizations (**T7.5**); (vi) **3 project Workshops** organized in coordination with the **CERIS (T7.4)**.

1.1.2. AMBITION: going beyond the state of the art

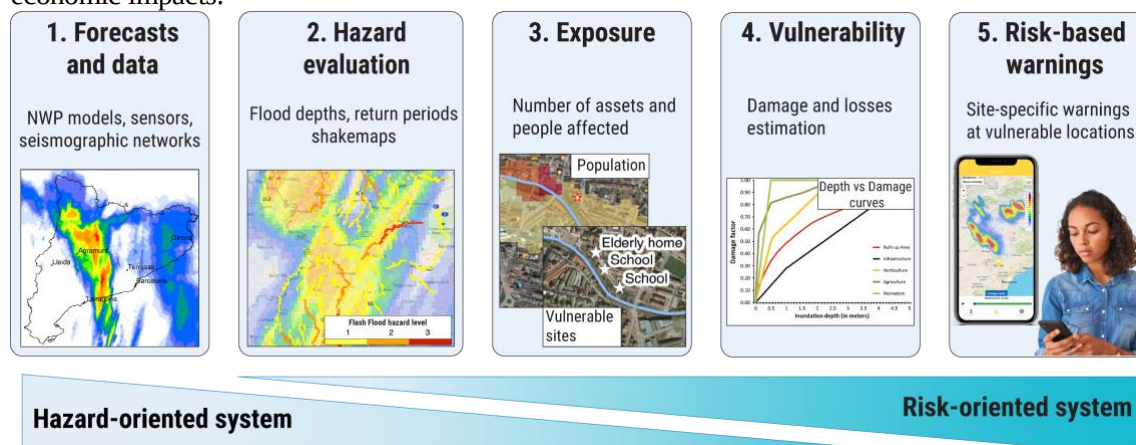
Following the extremely ambitious Topic call text, **GOBEYOND** is proposing a step ahead to support CPAs and first/second response during geo and weather events, capitalising on solid bases to ensure the feasibility of the proposed methodology (see 1.2.1). This includes the identification of best available geo and weather impact-based anticipation algorithms (**WP1**) available to be integrated into an **IEWS (WP3)**, but also the significant step ahead to evolve the present Multi-Hazard systems **to a new family of Multi-Risk IEWS and Decision Support System (DSS) (SO4)**.

This major innovation is supported by a number of complementary innovations described in an executive way in **Annex 1- Description of the action (Part A)** and based on the following key innovative concepts that **go beyond the present state of the art**.

1.1.2.1. From Multi-Hazard to Multi-Risk Impact-based Early Warning Systems

GOBEYOND will integrate **advanced impact-based algorithms into a real-time Multi-Risk IEWS platform** to supply impact products able to identify the magnitude of the consequences (fatalities, damage and loss) triggered by geo and weather hazards. The objective is providing **impact forecasts (when feasible) and estimates of the impacts** triggered by these hazards to generate the earliest impact information (i.e., mapping) to support the rapid deployment of first responders in vulnerable areas and the management of the emergency.

For each hazard, this is achieved through the methodology schematized in **Figure 2**: Real-time forecasts and estimates of the triggering phenomena are used as inputs in the hazard-assessment algorithms; the resulting hazard products are then combined with datasets characterizing exposure and vulnerability (see **Table 1**) to describe the expected socio-economic impacts.



Based on the experience of the consortium in developing impact-based products (more mature for the majority of weather/climate events), **GOBEYOND** will evolve and develop real-time impact products for geo hazards. The project will capitalize on existing algorithms for hazard and impact assessment (identified in **WP1**) and extend them to generate improved impact products in real time.

With this scheme, the **GOBEYOND Multi-Risk approach** is defined as the integration of this scheme into a **unified real-time IEWS platform running algorithms for impact assessment for the different types of geo and weather/climate hazards** (see 1.2.2). Incorporating this impact-assessment capability for the different hazard types in the central processing core of the **MR-IEWS platform** (see **T3.1**) supposes a **significant step forward with respect to the results achieved in previous projects**.

The algorithms included in the **MR-IEWS** will integrate hazard forecasts with available exposure and vulnerability datasets considering scale application (from continental to regional and local) and data availability to generate impact products estimating; e.g., the number of potentially affected population, number of fatalities, damages on buildings and infrastructures or the economic losses. Special attention will be paid to the estimation of the amounts of people in the hazard-affected areas. With this aim, **GOBEYOND** will use the data provided by the **DRMRC risk Data Hub** following the experience of recent projects (e.g., **ANYWHERE**), and account for the fluctuations of the population due to day/night dynamics (e.g., caused by commuting) and monthly variations (e.g., due to tourism) using the results of the EC-JRC Exploratory Research Project **ENACT**.

Table 1: List of forecasting/anticipation models, exposure and vulnerability data and models considered for use in WP3 and WP4.

Hazard	Model or system	Organization	Resolution	Scale
River flood	EFAS / GLOFAS	Copernicus / ECMWF	5 km	European/Global
Drought	EDO / GDO	Copernicus / ECMWF	5 km	European/Global
Wildfire	EFFIS / GWIS	Copernicus / ECMWF	8 km	European/Global
Extreme Heat	Thermofeel	ECMWF	9 km	Global
Flash flood and pluvial flood	FF-EWS	UPC	200 m	Regional/National
Flash flood and pluvial flood	TAMIR	UPC	1 km	EU
Flash flood and pluvial flood	ERICH	UPC, ECMWF	1 km	EU
Flood extension	COSPARIN	PREDICT	30 m	Global
Earthquake damage and fatalities	QLARM	ICES	1 km	Global
Landslides	ANYWHERE	UPC / BRGM	30 m	Regional
Storm surges	Flooding model	BRGM	Building size	Local
Earthquakes EEW: activation of automatic/individual protective actions based on alert broadcasting using cellular phone technologies and/or piloting automatic emergency actions.		UNINA		Regional
Earthquakes shake maps: Shake map accounting for the finiteness of the fault process. Standard shake maps will rely on USGS ShakeMap v4.0 approach or Bayesian updating method .		BRGM		Regional to global
Volcanic Impact Simulation model	EASE: estimate of potential losses (on buildings, occupants and roads)	UNINA		Regional
Volcanic Ash Plumes	FLEXPART-WRF	NOA		Regional
Tsunamis	UHAIR model	BRGM		Local to regional
Exposure Variable		Dataset	Period	Spatial res.
Building footprint and characteristics		OSM / OBM		
Infrastructure		OSM		
Population		GHS-POP / Worldpop	1990-2020	250m / 9 – 3 arc sec
Dynamic Population: Fluctuations of the population to take into account for day/night dynamics and monthly variations		ENACT EC-JRC	depending on variable	NUTS2
Settlements		SMOD	1990, 2000, 2015	30 arc sec
Land use		CORINE	1990-2018	100m
Health, education, transport and energy		JRC		100 m – 1 km
Health, education, transport and energy		HARCI-EU		1 km
Vulnerability Variable		Dataset	Period	Spatial res.
Income		SHDI	1990-2018	NUTS2
Education		SHDI	1990-2018	NUTS2
Age		GPW	2010	30 arc sec
Population demographics (incl. income, education, age)		EUROSTAT	depending on variable	NUTS2
Type of activities: Type of activities and expected damage if affected from regional and local databases		Regional and Local authorities	depending on variable	10 to 30 m
Available risk products	Variable	Developer	Resolution	Scale
TAMIR risk assessment	Flash Flood risk (real-time)	ECMWF / UPC	1 km	European
EFAS / GLOFAS Rapid Risk Assessment	Flood risk (real-time)	Copernicus	1 km	European
ReAFFirm / ReAFFINE	Flash Flood risk	UPC	200 m / 1 km	Regional / European

QLARM	Earthquake damage and fatalities	ICES	1 km	Global
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1.1.2.2. Impact-based Early Warnings supporting rapid deployment during weather events

GOBEYOND will advance in the adoption of the multi-risk approach (section 1.1.2.1) for weather and climate events (e.g. floods, heat waves, storms, storm surges) for improved emergency management and rapid deployment of first responders. This advance capitalizes on (i) the models and algorithms for hazard and impact forecasting developed in the H2020 project [ANYWHERE](#) and those operational in [CEMS](#), (ii) the experience in serving real-time multi-hazard impact forecasts (e.g. **PREDICT** systems running operationally >20000 municipalities worldwide; and **HYDS** DSS platform used by local, regional and national CPAs in Europe), and (iii) the operational capacity of **ECMWF** and **MCH** to run 24/7 models and promote/apply multi-risk methodologies to support agencies and end-users affected by hazards triggered by weather and climate events. Details are omitted due to the limited space for the text.

1.1.2.3. Impact-based Early Warnings supporting rapid deployment during earthquakes

When an earthquake happens, there are only few seconds between the rupture beginning and its devastating effect on population, buildings and infrastructures. The reliable prediction of earthquake ground shaking during or just after the earthquake occurrence may have an important role in the effective damage mitigation and represents the ambitious target of **Earthquake Early Warning (EEW)** and **Rapid Response (RR)** systems.

The main advance in **GOBEYOND** is the generation of **EEW and rapid impact estimates**, converting the shake maps obtained in real time into impact estimates (including economic losses, damage and fatalities). With this aim, **GOBEYOND** proposes an **integrated and multi-scale, time-varying approach for EEW and RR time scales**, where the initial P-wave motion amplitudes are first evaluated to predict “early shake maps”, while late strong shaking S- and surface wave arrivals are used for a refined assessment of the peak ground shaking and earthquake impact (**Figure 3**).

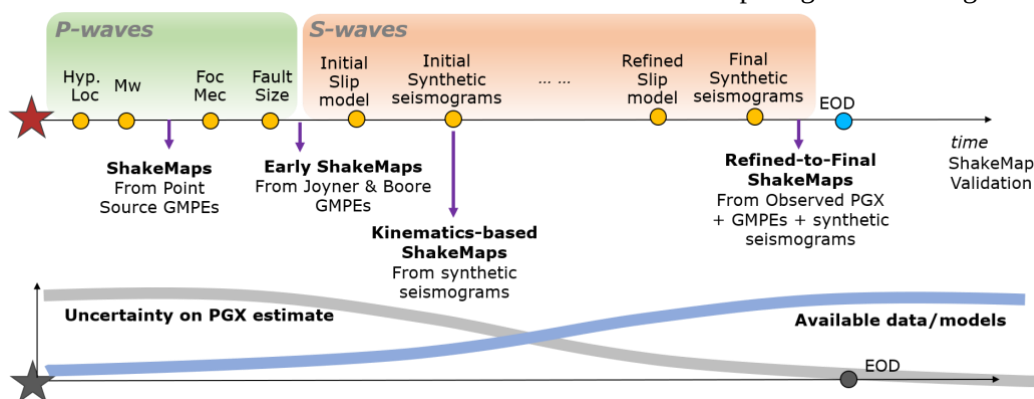


Figure 3: Conceptual scheme of the integration of **EEW** and **RR** systems: the increase of available data and knowledges about the physics of the source from the detection of an event to its end is expected to the reduce the uncertainty on the PGX estimates. ([Scala et al., 2022](#)).

This scheme will be applied in real time to produce: (i) earthquake early warnings; (ii) shake maps, leading to predicting damage to the built environment, and (iii) loss estimates, mapping the distribution of damage within city districts, probabilities of damage to infrastructures, probabilities of accessibility of possible routes between two locations of a road network and estimates of the number of fatalities and injured.

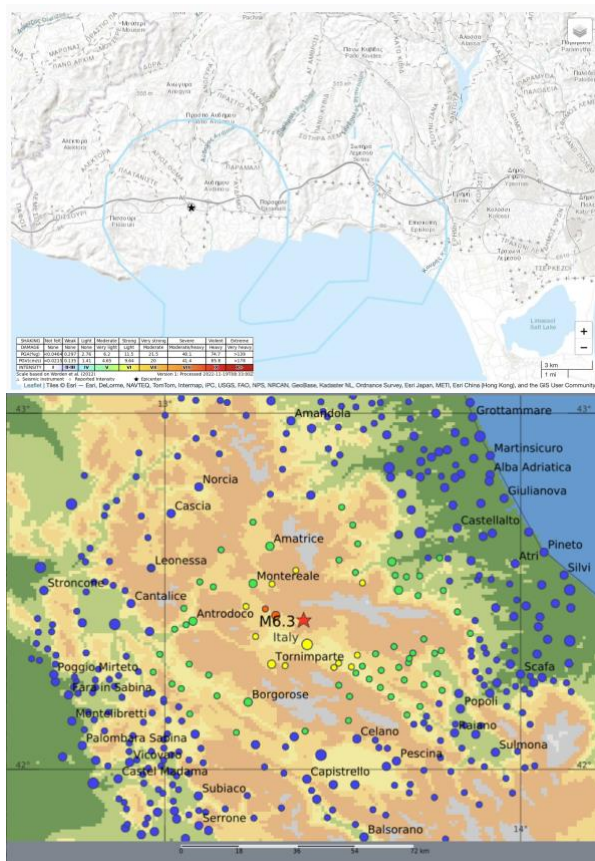


Figure 4: Earthquake impact forecasting proposed in GOBEYOND: (top) the Shake Maps of the earthquake of estimated magnitude 4.2 occurred on 19 Nov 2022 07:16:56 GMT in Cyprus, (product usually available at present in most EWS); source: RISE. And (bottom) the step ahead proposed by QLARM providing mean damage, illustrated in the l'Aquila (Italy), earthquake of magnitude 6.3 on 6 April 2009, where each dot represents a settlement. This map was distributed 22 minutes after the earthquake along with estimates of $50 \leq \text{fatalities} \leq 500$; and $100 \leq \text{injured} \leq 1300$. The observations were fatalities = 309, injured = 1000; source: ICES.

available in all GOBEYOND platforms, including the regional and local prototypes as well as the EU and UfM platforms during the demonstration phase (WP5).

1.1.2.4. Impact-based Early Warnings supporting rapid deployment during volcanic eruptions and tsunamis

The volcanic eruptions can cause damage on urban settlements affected. The emergency planning and management in these areas would require the evaluation of the impact induced on different elements exposed (people, buildings, infrastructures, economy, etc.) by different volcanic phenomena (e.g., precursor earthquakes, ash fall, pyroclastic flows, lahars, tsunami, ballistics, landslides) to quantify the necessary resources and to plan the operative intervention. **Currently, a proper EWS for volcanic risk does not exist.** GOBEYOND aims to fill this gap by adding impact-based products for volcanic eruptions to the MR-IEWS. The impact products will be obtained by combining information from (i) forecasting models, (ii) artificial intelligence, (iii) data from volcanoes worldwide, and (iii) advances in satellite monitoring (e.g., Sentinel-1).

The GOBEYOND MR-IEWS will include hazard-forecasting and detection systems (e.g., the high-resolution Lagrangian dispersion model FLEXPART-WRF for ash plumes using observations by the European Research Infrastructure ACTRIS) and run in near-real time the algorithms for impact assessment (EASE, for seismic and ashfall phenomena and DEB, for bradyseism) on buildings, population (number of fatalities, injured and homeless) and roads developed by PLINIVS (UNINA). For pyroclastic flows (the most devastating phenomenon), given the limitations to predict the hazard scenario in real time, the system will rely on a repository of probable event scenarios (such as those developed by INGV, or by the SPEED project). These impact products will be included in the MR-IEWS and demonstrated in the regional pilot site of Campania, one of the highest volcanic risk areas in the world, characterized by the presence of three active explosive volcanoes, Vesuvius, Campi Flegrei and Ischia. The final objective is to organically support the local authorities involved in the management of the volcanic emergency, especially the municipalities of the 'red zones'

At continental scale (over Europe and UfM), the system will capitalize on the experience accumulated in QLARM, and impact estimates by GOBEYOND will be issued and refined in three stages after an earthquake (Figure 4): (i) in less than 10 minutes, first estimates of the damages and number of fatalities based on point source; (ii) within 30 minutes, loss estimates based on an estimate of the direction and length of the rupture; and (iii) within 40 minutes, improved loss estimates, based on combining the measured and calculated shake maps. Thus, GOBEYOND proposes to upgrade QLARM to estimate casualties faster (< 10 minutes) and in greater detail for city districts, including the expected damage to hospitals, schools, and sensitive infrastructures. To that end, city models will be created for Piraeus (EL), Pozzuoli (IT), Estepona (ES), Setúbal (PT), Nice agglomeration (FR) and Al Hoceima (Morocco) by dividing the cities into districts including the information following the experience of ICES in Bucharest (RO) (Trendafiloski et al., 2009) or Kadamjay (Kirgizstan) (Rosset and Wyss, 2022; Rosset et al., 2020). The fluctuations of the population due to day/night dynamics (e.g. caused by commuting) and monthly variations (e.g. due to tourism) will be considered. The impact products will also include an estimate of the financial losses generated minutes after any earthquake in the target areas, obtained using datasets of building values and loss ratio curves, and timely sent to CPAs.

At regional scale, GOBEYOND will demonstrate EEW and RRS using the fast telemetry and dense sensor networks in the pilot site of Campania. It will use the sensor network of the Italian National Institute of Geophysics and Volcanology (INGV) connected to the systems of UNINA. From the intensity distributions of the phenomena provided by INGV, the system will produce impact maps, in terms of damage caused on the elements at risk by seismic events (collapsed buildings, unsafe buildings, homeless, dead, injured and interrupted roads) to support the management of the early phases of the emergency and coordinate Search and Rescue activities.

These impact products will be produced and supplied in real time by the GOBEYOND MR-IEWS and the products will be

(that will have to be evacuated during the ‘alarm phase’, before the eruption occurs). The platform will be tested through **a local Exercise in the Pozzuoli city (POZZ)** during the project subjected to volcanic risk due to Campi Flegrei.

The **GOBEYOND MR-IEWS** will also include tools to assess the impacts caused by tsunamis. These will be based on scenarios pre-calculated by high-resolution modelling including (i) the possible tsunamigenic sources, (ii) tsunami modelling integrating realistic variability of the source (i.e., for earthquakes: stochastic slip distribution, variability of fault geometry and rupture size), with a modelling strategy adapted to targeted areas (e.g. UHAINA model - [Fillipini et al., 2018](#)); (iii) flood modelling in complex urban areas; (iv) impact assessment for the different scenarios, transforming the modelled flood levels into induced damages and losses. The **MR-IEWS** will store the databases of scenarios for the regional pilot sites, which may be queried in case of an event (estimation of the closest previously modelled scenario) to determine the areas where the most important impacts can be expected. In some of the pilots where the tsunami hazard is more significant, as **LEPE** and **ICRIS**, these scenarios are already available, and the main advance of the project is their application within the real-time **MR-IEWS** to develop/trigger operational self-protection protocols.

1.1.2.5. Co-creation through Living Labs (LL)

A central ambition of **GOBEYOND** is to implement a **co-creation framework** in which authorities, citizens, and civil society representatives **can feel listened to, and actively engaged in co-design and co-creation roles** as the best pathway to overcoming the challenges of collaborating together in developing innovative MR-IEWS adapted to regional and local needs. **GOBEYOND** will follow participatory approaches in all cities and regions running the WP5 demonstrations. But in the 3 EU regional pilot sites, the **SSH concept of LL** ([Schumacher and Feurstein, 2007](#)) will be followed to **proactively target the real needs of the users from the very beginning**. The LL approach belongs to the family of **user-centred innovation approaches**. It focuses on the engagement of the **Quadruple Helix** – research, public sector, business, and citizens – in the **co-design processes**. LLs are successful in projects that aim at fostering new values **integrating the local stakeholders’ knowledge** to produce **new governance thinking and social transformations** ([Bulkeley et al., 2016](#)). They have been successfully used in urban policies, smart cities developments, sustainable innovation and renewable energy. However, **there is little experience with setting up LLs for crisis and disaster management or integrated DRM**, even if the role of local communities and spontaneous volunteers in various phases of DRM has been the **object of previous research**. Therefore, the **GOBEYOND** proposal is a real innovation that will build on promising emergent initiatives at regional and local levels and use the LLs as ‘**real-life settings**’ to **co-create knowledge** about the sustainability of such initiatives ([Hirvikoski et al., 2020](#); [Kronsell and Mukhtar-Landgren, 2018](#)). Thus, the **GOBEYOND** LLs will be deliberately constructed as places where **local multi-stakeholders will develop collaborative research and mutual learning trajectory**, working ‘from below’, **capitalising on the participatory experiences and the social fabric** of early-adopter regional authorities and municipalities engaged with the proposed co-creation process innovation.

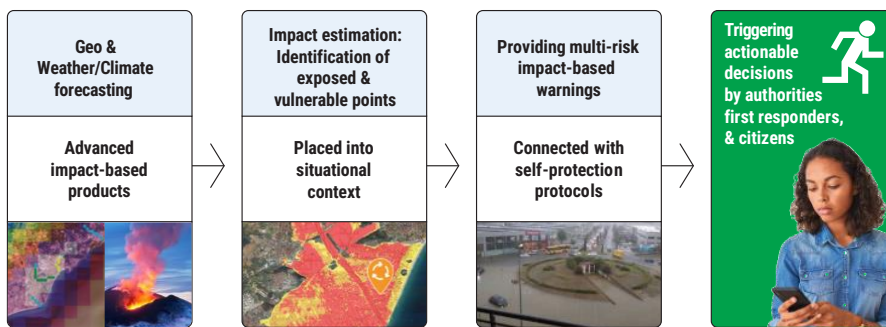
This innovation will **be implemented as 3 EU regional LLs** through structured co-creation workshop sessions in **WP2**. These sessions will involve first/second responders, authorities and citizens associations representing their communities invited through the **municipalities and regional authorities**. **WP3** and **WP4** will incorporate the requirements identified by the LLs in their developments, and **re-evaluate them several times through the LLs sessions** during the operational demonstrations (**WP5**), ensuring a continuous exchange and rapid feedback between all partners and stakeholders involved. The outcomes will be **co-evaluated (WP5)** enabling **experimental learning** built on the collective experiences. Additional stakeholders will be invited to participate in the process through the **CoP (T7.5)**.

1.1.2.6. Site Specific Warnings (SSWs) triggering actions from Self-Protection official protocols

GOBEYOND will apply the innovative concept of **dynamic vulnerability** (see **Figure 5**): converting present EWS into **Impact-based Early Warning Systems (IEWS)** able to provide **site-specific warnings (SSWs)**. These innovative warnings are **connected to local self-protection protocols** and risk management plans to **trigger pre-defined actions to reduce the vulnerability in a given location for a given time window** based on the local risk and response capabilities. **This paradigm-change in IEWS is a societal transformation** requiring a framework to gain **TRUST among the citizens** and **massively implement multi-risk plans of actions adapted to every city or community**.

GOBEYOND proposes that the **best pathway to achieve this societal transformation** is (i) to **co-design the proposed solutions paying attention to the regional and local needs**; (ii) to **implement and demonstrate them in pilots**, testing them in a variety of conditions; and (iii) to **showcase the success stories to promote massive adoption**. Of course, the time frameworks and the nature of the actions will depend on the type of hazard (droughts, volcanic eruptions or heatwaves require different approaches than earthquakes, wildfires or floods) and on the affected location. In any case, we already have the methodologies to make it possible, as the **ANYWHERE demonstrations** have shown.

Figure 5: GOBEYOND dynamic vulnerability approach: Impact forecasting EWS are used to interpret the situational context and identify the specific areas and points where the most significant impacts are expected to occur in the following hours. The system provides SSWs for these points with pre-defined messages enabling all actors (authorities, first/second responders, engaged



citizens and communities) to trigger pre-defined site-specific actions from the local self-protection protocol to reduce their vulnerability dynamically in a given location and time window.

1.1.2.7. Providing MR-IEWS beyond Europe

GOBEYOND will also rely on the working methodology, tools and data produced to support risk

managers and local authorities beyond the borders of the EU in the Mediterranean basin. Thus, the province of Al Hoceima will be able to benefit from the products and data of multi-hazard outputs (floods, earthquakes, landslides, tsunamis, forest fires...), while using the tools already in place within the Kingdom of Morocco. This approach should allow to start an international platform to provide IEWS for the whole Mediterranean basin: the **EW4MED (T3.3)**, that which allow GOBEYOND to contribute to support the Target G goal of the [SFDRR](#) and to the [WMO action plan EW4ALL](#), declared as international priority by the UN at COP27.

1.2. Methodology

1.2.1. General structure

GOBEYOND is conceived as an **Innovation Action** directly responding to the "extremely ambitious" Topic call text requests. Thus, the project is designed to **move from available technology to solutions tested in operational environment**, ready to be used in the real world after the end of the project. GOBEYOND focuses on **identifying the most advanced and innovative available methodologies for providing impact forecasts** and improving the present capacities of EMCs to manage rapid deployment and response during **geo and weather/climate and events (SO1)**.

WP1 will survey and benchmark the exploitable results obtained in previous EU projects like: [ANYWHERE](#), [EMERGENT](#), [LINKS](#), [ERICA](#), [TAMIR](#), [ARISTOTLE](#), [RESIN](#), [RECONNECT](#), [MYRIAD-EU](#), [OPERANDUM](#), [PANOPTIS](#), [I-REACT](#), [BEAWARE](#), [CLARITY](#), [TURNKey](#), [RISE](#), [DEEPVOLC](#), [ASTARTE](#), [ESPRESSO](#), [EPOS-IP](#), [SERA](#), [REAKT](#), [VESPER](#), [GITEC-TWO](#), [SEAHELLARC](#), [COSPARIN](#); selected [UCPM \(DG-ECHO\)](#) prevention and preparedness projects; and in other successful experiences worldwide (like [QLARM](#)). The selected components will be added to the methodologies and algorithms already developed by the Consortium in previous projects (see [Table 2](#)), and will be integrated into the **GOBEYOND MR-IEWS platform according to the co-design produced in a collaborative framework (WP2)**. WP2 will materialise this **participatory approach (SO3)**, adapting the **LL framework** to effectively engage **first/second responders, regional/local authorities as well as representatives of the key communities** in the co-design, co-creation and co-evaluation of **the methodologies and platforms** to be developed in **WP3** and **WP4**. WP2 will apply the proposed approach to **LLs in the 3 EU regional pilot sites** to ensure that the user needs and requirements are included in the innovation process from the very beginning. These **LLs** will continue running along the implementation and operational demonstrations of the platforms (**WP5**) allowing to extend the participatory approach to the co-evaluation phase.

Based on this co-creation framework, **GOBEYOND proposes a major innovation in the field** developing a **Multi Risk-IEWS platform (SO2)**. This is a major step ahead proposed by the project, since at present there are [very few EWSs providing impact forecasting](#) for the majority of the hazards integrated in the **Multi Risk-IEWS**. And it *goes beyond* what is requested as expected outcome in the Topic call text (just a multi-hazard platform).

To ensure the feasibility of this **MR-IEWS** we propose developing a single system able to feed different types of **integrator user-interfaces** (see [Figure 6](#)). Thus **GOBEYOND MR-IEWS** will be composed of a common **Processing Core (T3.1)** able to run the selected **AI algorithms (WP1/WP2)**, which will be either run in existing operational platforms (such as [CEMS](#)) or encapsulated in the [European Weather Cloud](#) facility. The generated impact forecasts will feed a "multiplicity" of front-ends to respond to the different needs of international, national, regional and local CPAs and first responders through a highly customized **Decision Support System (DSS) (SO4)**.

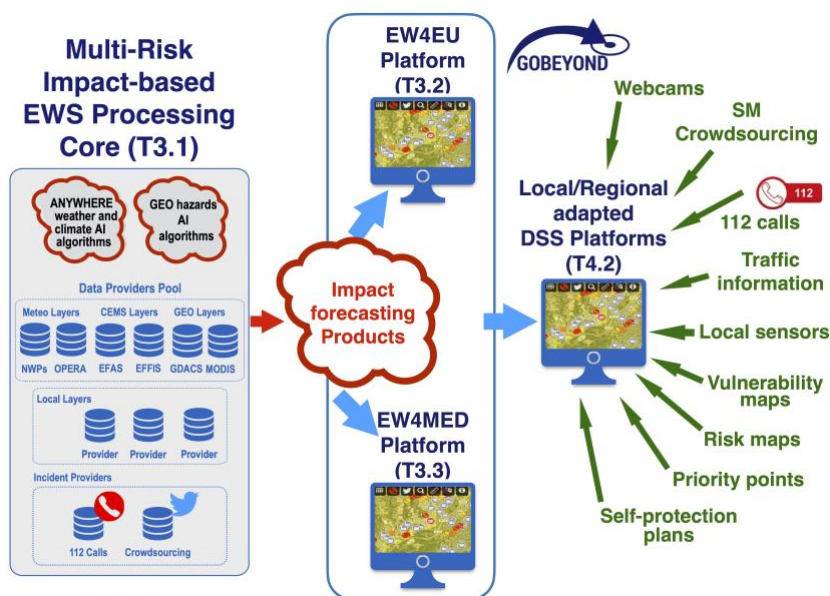


Figure 6: Scheme of the **GOBEYOND** weather, climate and geo **Multi-Risk Impact-based Early Warning system (MR-IEWS)**, composed of a common **Processing Core** and three types of **DSS platforms** adapted to the needs of the different use cases (international/national, regional and local).

weather/climate events. This regional/local **DSSs** will be highly configurable and adaptable to the requirements of different locations, and will offer **real integration of the most advanced Impact-based forecasting algorithms for geo and weather hazards with high resolution vulnerability, exposure and risk information (WP4)**. These **regional/local MR-IEWS** will include advanced capabilities as pre-identification of most vulnerable points and activities; **advanced communication services** based on the latest developments on [Site Specific Warnings \(SSWs\)](#) and [SMS Cell Broadcast technologies](#) (SMS-CB); and capacities to **trigger actions through their integration with regional emergency and local self-protection plans**.

GOBEYOND will also adapt the **MR-IEWS** to the countries of the [Union for the Mediterranean](#) developing a second version of the international level user-interface (**EW4MED**), adapted to its use in the South Mediterranean countries of the [UfM](#) (**WP3, T3.3**) using the available information and coping in the best possible way with the data availability limitations. This **EW4MED** platform will be a significant contribution of the project to the **Target G of the SFDRR**, and the [UN global initiative EW4ALL](#).

GOBEYOND has all the must factors to achieve this ambition: (i) The methodology is designed to capitalise on **existing legacy solutions from previous projects and experiences** in the operational use of EWS for geo and weather/climate by the Consortium (see Table 2), including the project **winner of the EC Security Innovation Resilience Award in 2022**; (ii) the Consortium brings together top research institutions (UPC, UNINA, BRGM, NOA and ICES), international lead operational hydrometeorological forecasting services ([ECMWF](#) and [MCH](#)), and enterprises **already delivering DSS services including impact-based forecasts and impact-based warnings** adapted to regional/local authorities ([PREDICT](#), [HYDS](#) and [DRAXIS](#)); (iii) **14 early-adopter regional and local CPAs and first responders** will participate in the project from the very beginning, constituting a **unique empowering force to achieve this major innovation**. Finally, the project will launch an **Open Call for innovative complementary solutions (T6.3)**, and the winner institution will be funded as third party of the project ([following a FSTP procedure](#)) to integrate the proposed innovation to the **GOBEYOND MR-IEWS platforms**.

Table 2: Previous funded projects in which **GOBEYOND** capitalise on

Project acronym and link to	Key developments and results to be used in GOBEYOND	GOBEYOND Partners involved
ANYWHERE	ANYWHERE Impact forecasting products for weather and climate emergencies; MH-EWS A4EU, national, regional and municipal prototypes. Operational implementations in 7 national/regional pilot site demonstrations.	UPC (Coordinator), ECMWF, HYDS, AMAYA, PREDICT, CECAT, DGCPE
TAMIR	Advanced Tools for pro-Active Management of Impacts and Risks Induced by Convective Weather, Heavy Rain and Flash floods in Europe	UPC, ECMWF
BEAWARE	Integrated solution to support forecasting, early warnings, transmission and routing	Coordinated by Dr.

	of the emergency data and management of the coordination between FRs and CP authorities	Anastasios Karakostas (now at DRAXIS)
ERICA	Operational Flash Flood and Storms impact indicators at EU scale.	UPC, ECMWF
SERA	Seismology and Earthquake Engineering Research Infrastructure Alliance for Europe	UNINA, BRGM
MEDIATE	Multi-hazard and risk informed system for Enhanced local and regional Disaster risk management.	BRGM
RISE	Multi-hazard and risk informed system for Enhanced local and regional Disaster risk management.	UNINA
QLARM	QLARM (Quake Loss Assessment for Response and Mitigation) is a computer code with world data sets of population and building stock that calculates losses (building damage, injured, and fatalities) due to strong shaking in earthquakes. It is used to provide alerts after large events worldwide since 2003.	ICES
TURNKey	New algorithms and tools for earthquake operational forecasting, earthquake EWS and rapid response (shake-maps, rapid impact assessment) based on multi-sensor solutions (low-cost sensors, crowd-sourcing), DSS based on risk assessment	BRGM
CLARITY	Integrated Climate Adaptation Service Tools for Improving Resilience Measure Efficiency	UNINA
EPOS-SP	European Plate Observing System - Sustainability Phase	BRGM, NOA
SPEED	Scenarios of Hazard and Damage at Vesuvius and Campi Flegrei	UNINA
SERA	In SERA new methods for the evolutionary and probabilistic computation of shake maps accounting for the extended source geometry have been developed and tested on 2016-2017 Central Italy earthquake sequence	UNINA leader of WP26 Real-time earthquake shaking
EPOS-IP	Platform (CREW – Earthquake Early Warning Testing Center) for testing and validation of earthquake early warning methods and technologies. The platform grounds on realtime data streaming from the accelerometric network ISNET.	BRGM, UNINA, NOA
REAKT	Strategies and tools for Real time Earthquake Risk Reduction. In this project UNINA proposed and developed new regional and onsite earthquake EWS and applied it	BRGM, UNINA
ESPRESSO	Enhancing synergies for disaster prevention in the European Union	Coordinated by Prof. Zuccaro (UNINA), BRGM
ASTARTE	Assessment STRategy And Risk for Tsunami in Europe	NOA
COSPARIN	ESA/CNES project combining space and AI to provide Estimated satellite precipitation every 30 minutes at 5km and maximum flood zones in all territories.	PREDICT
CEMS-EWS	Operational early warning services on the European and global scale of floods (EFAS, GloFAS), wildfires (EFFIS, GWIS) and drought (EDO and GDO).	Computational center run at ECMWF

All the **GOBEYOND** developments will be **demonstrated in operational environment** during the **24-month operational demonstrations (SO5) in 6 pilot sites in WP5: 3 EU regional demonstrations + one in a Swiss Canton + 1 UfM regional demonstration in Morocco + a distributed municipal demonstration in 4 EU cities**. These **GOBEYOND** demonstrations have been selected to involve early adopter CPAs and first/second responders in areas affected by several major geo and weather/climate disasters in Europe and the **UfM**. The pilot-site **LLs** set up in **WP2** will be actively working along the **24-months demonstrations (WP5) in T5.3 to T5.5**. They will analyse the results; collecting feedback about the effectiveness of the implementations from the involved communities and authorities; identifying improvements of the prototypes to be integrated in **WP3** and **WP4** by the developers. **Legal, ethical, gender, and inclusive aspects** will be considered in the co-design of the platform and in the collection of information for co-evaluation of the performance during the demonstration.

WP6 will establish the **Adoption Accelerator Program (AAP)** as the **GOBEYOND** strategy to promote the exploitation of the results, **ensuring their sustainability** starting before the end of the project. The program will actively contribute to the **EC Mission Adaptation to CC** and other international initiatives promoting adaptation and global risk reduction policies as the **SFDRR**, **SDG Goals (SO5)**, and the **UN global initiative EW4ALL**.

The **AAP** will include the activation of measures to boost innovation and exploitation through an **Innovation, exploitation and market uptake plan (T6.1)** and a **Scaling-up and adoption outreach plan** preparing the scalability and promoting the adoption of the **GOBEYOND** solutions (T6.2). **WP7** is entirely devoted to **maximize the impact** of the project. **T7.1** will design and implement the project **Communication and Dissemination Plan**, including the visual identity, the website, and the links with the **Social Media**. **T7.2** will design and run the **Data Management Plan (DMP)**, implementing appropriate procedures to manage the data generated and/or collected during the project according to the **FAIR** principles and **actively support Open Science**. The **DMP** will set clear guidance on the

measures taken to safeguard and protect sensitive data to **preserve the Privacy, Ethics, and Security**. A collection of project videos and other audio-visual contents of the project will be created in **T7.3**. **Three Workshops and two Hands-on trainings** will be organized by **T7.4** and **T7.6** to present, and learn how the project solutions work, showing the main results from the **6 demonstrations**. **T7.5** will build the **GOBEYOND Community of Practice (CoP)** with **>50 institutions** interested in the project developments, including first/second responder authorities and agencies, NGOs, civil society associations, policy and decision-makers, enterprises as well as scientists and developers in the field of geo and weather emergencies (**SO6**). **GOBEYOND** will collaborate as much as possible with the activities promoted by the **CERIS**, and will extend these activities to maximize impact on decision- and policy-makers in the EU (**T7.7**). Finally, **WP8** ensures the **management activities of the project**, monitoring the proper implementation of the work plan and a smooth advancement towards the objectives. It includes all the actions required to solve potential conflicts, coordinate with the EC and present the results in the reviews.

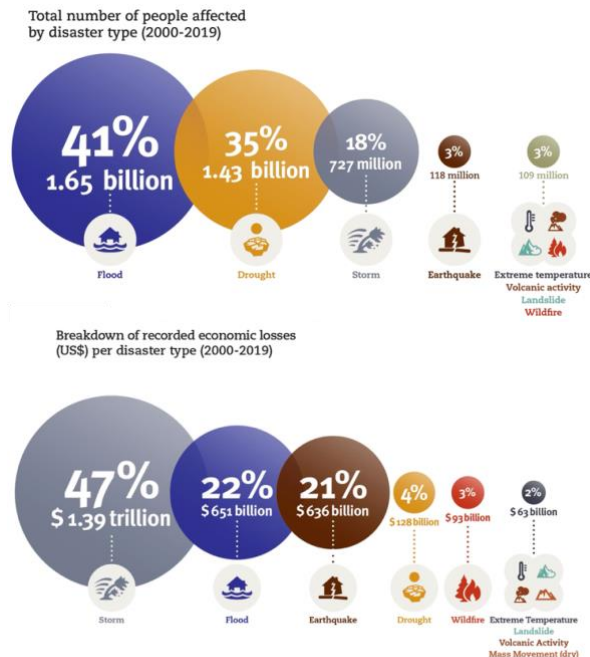


Figure 7: Graphics showing the relevance of the different natural hazards worldwide in terms of number of people affected and recorded economic losses between 2000 and 2019. *Source: CRED.* From the point of view of the economic losses and people affected, the main ones are: Floods, Storms, Earthquakes and Droughts. They will be the key ones addressed in priority by the developments in **GOBEYOND**.

pilot sites of the ANYWHERE IA). These experiences showcase the **need to run these demonstrations during long periods** (more than one year) to (i) ensure the capacity to catch significant events, (ii) enable their progressive integration within the first responders and CPAs protocols, (ii) and improve the prototypes **with the feedback from all the actors involved** via iterative loops, making possible a **real co-creation framework**. Finally, these long-term demonstrations can cultivate the progressive trust on the supporting tools and services, a crucial aspect for a complex social transformation as creating societal resilience.

Therefore, **GOBEYOND** proposes a **6+1 demonstrations of the GOBEYOND MR-IEWS platforms in a period of 24 months** (from M21 to M45). A **municipal level demonstration in 4 EU cities/agglomerations** will test the advanced capacities for supporting local response and warning communication with Citizens and communities. **Tasks T5.3 to T5.8** describe the details of the proposed demonstrations, and their specific and complementary focus are summarized below and in **Figure 8**. An additional **Not-identified demonstration** is added to support to maximize impact (see **T5.9**)

1.2.3.1. Andalusia region (ES)

T5.3 will implement an adapted version of the platform to the Andalusia region in collaboration with the regional Civil Protection authority (**EPCA**), a governmental agency acting as first responders (**AMAYA**) and the CPA of the Estepona city (**EST**). The region is affected by all major geo and weather hazards. The focus of this demonstration will be to evaluate how a **MR-IEWS** can be integrated in regional and local response protocols, and to evaluate the effectiveness and the time savings in deploying the intervention units for the protection actions. Two additional cities, **LEPE** and **ICRIS**, exposed to tsunami risk, will participate as associated partners. The capacities of the **GOBEYOND MR-IEWS** to facilitate the coordination with other regions (**CECAT** and **AVSRE**) and with the national level (**DGCPE**) will be also demonstrated. A **LL** will be set up at regional level, with co-design sessions in the three cities. **HYDS** will be the

1.2.2. Main Hazards to be prioritised

Recent studies assessing the impacts of natural disasters show that at global scale the major natural hazards by the number of people affected are essentially **Floods, Storms and Droughts** (see **Figure 7**). **Earthquakes** can also be considered among the most relevant because of the damage and economic losses they cause. These four natural hazards, together with the increasing heat waves, are also the main ones in Europe and **UfM** countries. However due to the main target of the Topic call (support the rapid deployment of first responders), hazards that develop during medium to long time periods (as droughts or heatwaves) are usually not responsibilities of CPAs and first responders. Therefore, **Floods, Storms and Earthquakes will be the main priority in the GOBEYOND developments**. Nevertheless, the proposed **MR-EWS** will include support to the other major hazards cited in the Topic call text (Heatwaves, Storm surges, Volcanic eruptions, tsunamis) and those directly affecting European and **UfM** countries (as droughts, landslides or forest fires) to improve the overall situational awareness and efficient response.

1.2.3. Co-creation via 6+1 demonstrations in operational environment

Demonstrations in **operational environment in geo and weather/climate risk-prone areas is a successful innovative procedure for testing, evaluating and demonstrating high-TRL tools and systems** (as shown by the results and lessons learnt during the 18-month operational demonstrations in **7 EU**

developer and **UPC** will provide technical support to this demonstration. **Workshop 1** will be organized by **EPCA** and **AMAYA** in **M18** and **DGCPE**, as national CPA, will present the developments to the [UCPM](#) and [ERCC](#).

1.2.3.2. [Attica region \(EL\)](#)

T5.4 will implement an adapted version of the platform to the Attica region in collaboration with the regional Civil Protection authority (**ATT**), the largest Greek Search and Rescue NGO acting as first responders (**HRT**) and the CPA of **PIR** city. The region is affected by all major geo and weather hazards and includes the urban area of Athens (the 7th largest in EU). The focus of this demonstration will be to evaluate how **GOBEYOND MR-IEWS** will integrate all the local and regional relevant information (such as vulnerability and risk maps) together with multimodal data from different sources (such as sensors) into a unified user-interface for the advanced Emergency Control Centre. The evaluation will also focus on the capacity to trigger decision action from the regional response protocols. A **LL** will be set up at regional level with participation of key stakeholders and communities from **PIR**. **DRAXIS** as technology provider and **NOA** as a scientific expert will provide the needed support to this demonstration. **The final Workshop and Hands-on training** will be organized by **ATT** in **M46** and all **CoP** stakeholders invited to maximize impact.

1.2.3.3. [Campania region \(IT\)](#)

The Campania region and the Naples agglomeration is one of the most exposed urban areas to geohazards in the EU. Specifically, the town of Pozzuoli (82k inhabitants) located within the high volcanic risk of the active caldera of Campi Flegrei, has experienced during last decades intense and continuous seismic activity, ground deformation and geochemical manifestations. Thus, this demonstration (**T5.5**) will mainly focus on testing the **GOBEYOND MR-IEWS** capabilities for earthquakes and volcanic eruptions. The demonstration will integrate a twofold approach:

1) The CPA of the Pozzuoli municipality (**POZZ**) will test an adapted version the municipal **MR-IEWS**. Specific attention will be given to evaluate how the impact forecasting products can support the activation of their already developed response protocols and inform the population. A **LL** promoting the engagement and participation of citizens will be set in place and advanced systems for bi-directional communication (a specific APP supporting the interaction between citizens and authorities to improve situational awareness) will be implemented and tested.

2) The advanced seismic network for earthquake detection and alert deployed and operated in the volcanic area by the National Institute of Volcanology and Geophysics will be the core infrastructure for earthquake EW and rapid response in the occurrence of potential damaging earthquakes (M 4-5) during the pre-eruptive phase. The **MR-IEWS** will automatically process the first signals detected, evaluate the expected impact (in terms of strong ground shaking, and potential damage and loss) over a large area in and around the caldera, and broadcast the **SSWs** to the **POZZ** municipality, and to a restricted sample of end-users through a dedicated cell phone app. Shakemaps will be evaluated and an estimation of damage and loss impact using a dedicated version of QLARM will be calculated. This information will be released to **POZZ** to support the rapid deployment and safety actions.

The advanced prototype already developed by **UNINA** will allow **GOBEYOND** to test the possibilities of such systems in optimal conditions. While managing the alert few seconds after the earthquake occurrence may represent a big challenge, this approach can be exported on other volcanic and tectonic areas where large earthquakes/volcanic eruptions may happen in the proximity of huge urban settlements. This will allow **GOBEYOND** to establish a landmark in Earthquake EWSs and set the direction for the future developments. **UNINA** will provide technical support to this demonstration and **HYDS** will act as developer. **Workshop 2** will be organized by **UNINA** in **M31**.

1.2.3.4. [Province of Al Hoceima \(MA\)](#)

T5.6 will implement an adapted version of the **GOBEYOND EW4MED** platform (**T3.3**) to the Province of Al Hoceima in collaboration with the Agence pour la Promotion et le Développement économique et social des préfectures et provinces du Nord du Royaume (**APDN**) and the Directorte of Natural Risk Management under Ministry of the Interior of the Kingdom of Morocco (**DGRN**). **PREDICT** will act as developer and will use their already implemented platform **VIGIRISQUES** to integrate the impact forecasting capacities integrated in the **GOBEYOND MR-IEWS Processing Core (T3.1)**. This will allow Morocco to have access to an EWS with unprecedented capacities in the country, as well as serve as showcase of what can be done in the countries of the [UfM](#), and in general to support the [UN EW4All](#) initiative in Africa. A **project meeting** will be organized by **APDN** in **M37** and **CoP** stakeholders invited to maximize impact.

1.2.3.5. [Swiss Canton¹ \(CH\)](#)

Switzerland already has an advanced **multi-hazard information platform GIN** developed by the federal institutions responsible for natural hazard warnings including **MCH**. The platform is accessible by all Swiss cantons and in operational use since several years. However, it provides only information on natural hazards without impacts information

T5.7 will implement and operationally run an adapted version of the **GOBEYOND MR-IEWS platform based on the national GIN platform**. It will use the [Climada impact modelling framework](#) to provide further impact information to the prototype platform and use the prototype to investigate the end-user requirements in a continuous dialogue.

¹ The Canton is not yet decided, but the Ministry of Interior (**MCH**) will involve the required CPAs and first responders.

Specifically, the **developed EW4CH platform** will be made available to the CPA and the intervention forces of the Canton with about 800 k inhabitants and a mixed topography (mountainous and flat areas) exposed to all the natural hazards known in Switzerland. **MCH** will lead this demonstration and will receive the support of the technical partners to develop the adapted prototype **EW4CH**.

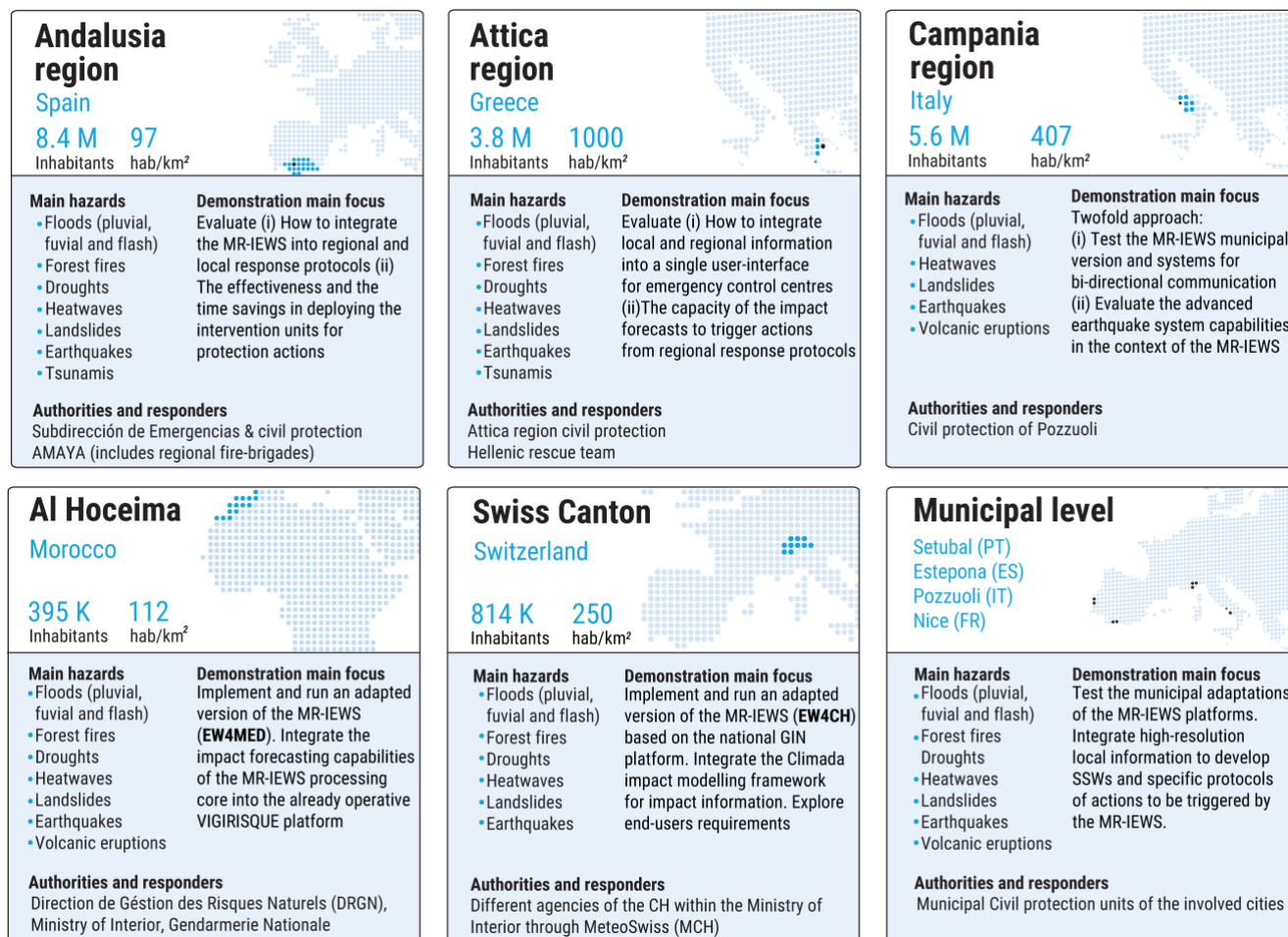


Figure 8: GOBEYOND demonstrations: 3 EU regional pilot sites including LL sessions, plus pilots in a Swiss Canton and the Al Hoceima Province in Morocco supporting the capacity to extend the MR-IEWS platforms to the UfM countries, and a sixth at municipal level in 4 EU cities, supporting local first responders, authorities and empowering citizens as "assets".

1.2.3.6. Municipal demonstration in 4 distributed pilot-sites

T5.8 will implement a demonstration at municipal level in the **4 EU cities** partners of the project, acting as distributed pilot-sites. Through **WP2**, the municipal needs and requested specifications will be compiled and **specific municipal adaptations of the MR-IEWS platforms** will be developed by **HYDS** and **PREDICT** to be used in Setúbal (**SET**, PT), Estepona (**EST**, ES) Nice (through the **SMI**, FR) and Pozzuoli (**POZZ**, IT).

These local demonstrations will focus on using the high-resolution information available at local level (including the analysis of historical events) to **develop SSWs and specific protocols of response actions to be triggered by the impact forecasting products of the MR-IEWS**. The **LLs** set up in **WP2** will be the collaborative framework to co-design community Self-Protection plans adapted to the areas and communities most vulnerable in these cities, conceived to be activated using the local **SSWs** as triggers. A specific effort will be done to engage associations and citizen representatives in the **LL** sessions, to test how these participatory approaches at municipal level can lead to more efficient response plans, and how they can **transform the citizens in "assets" during real-life emergencies**.

A **project meeting** will be organized by **SET** in **M13** and by **SMI** in **M37**. **HYDS** and **PREDICT** will be the developers and **UPC**, **BRGM** and **UNINA** will provide technical support.

1.2.3.7. Not-Identified additional demonstration: Life test of the capabilities of GOBEYOND

An additional demonstration is added to be able to add a Life-test of the **GOBEYOND MR-IEWS** capabilities to deal with an unexpected disaster out of the selected 6 pilot sites. As the probability to register a geo or weather hazard out of the demonstrations is huge, a project task force will be ready to respond to these disasters in real time with the tools available at the time (based in the **EW4Europe** and **EW4MED** platforms), providing a situational analysis of the event and showing the added-value of making available these systems. **T5.9** will implement this action and will provide **D5.4** with the event analysis that may be recorded.

1.2.4. Interdisciplinary approach and cross-disciplinary cooperation

Sustainable and holistic DRM strategies can only be built [by integrating all relevant sectors and disciplines](#). **GOBEYOND** is ensuring this by design, thanks to the **composition of the consortium** (see Section 3.3) and through the proposed **3 LLs framework for co-creation implemented in the EU regional demonstrations**, which will engage key actors at regional and local level. Additionally, to maximize the **interdisciplinary approach** we will **establish a ‘Network of existing networks’** strategy to **foster cross-disciplinary cooperation and interdisciplinary dialogue and exchange beyond the project** by connecting with existing Networks of Practitioners and by **creating a Community of Practice (CoP)** in **T7.5**. The **CoP** will include **> 50 stakeholder institutions and civil society organisations** participating in the analysis of the results and in the discussions, dialogues, recommendations and workshops of **GOBEYOND**. The **CoP** will also **connect** with the [Community of European Research and Innovation for Security \(CERIS DG-HOME\)](#), the [IFAFRI](#), and other Knowledge Centres as the [UCPKN](#) (DG-ECHO), and the [DRMKC](#) (DG-JRC) (**WP7**). Three **annual Workshops will be organised in coordination with the CERIS-DRS activities (WP7)** to showcase and discuss the results from the **GOBEYOND** demonstrations. Additionally, results from other DRS H2020 and HE projects (as [LINKS](#), [RESILOEC](#), [RISKPACC](#), [CORE](#), [ENGAGE](#), [CLINT](#), [MYRIAD-EU](#), [DIRECTED](#), [The HUT](#), [C2IMPRESS](#), [PARATUS](#), [COSPARIN](#), etc.) will also be presented, creating synergy between all the current initiatives committed to developing CCA governance strategies.

Finally, through its **26 partners**, the **>50 LL participants** and the **>50 stakeholders involved in the CoP**, **GOBEYOND** plans to effectively support the **development of interdisciplinary and sustainable solutions and strategies**.

1.2.5. Use of Artificial Intelligence

Artificial intelligence (AI) is playing an increasingly important role in DRR: from the forecasting of extreme events and the mapping of impacts, the detection of events in real time when anticipation is not possible, to the provision of situational awareness and decision support, and *beyond*. All, these aspects are in the core of **GOBEYOND**. In order to strengthen the political support for AI in Europe, the project will observe the [European strategy on how AI should be used for improving people’s lives](#). Thus, the project is employing AI to tackle some of the most innovative changes in the EWS field while ensuring that it is used from a human-centric and trustworthy perspective.

The AI algorithms used in **GOBEYOND**, that will not be applied to personal data, will be built ensuring they are **technically robust, accurate and reproducible**. Their support to convert atmospheric and geophysical data into impact data will be **reliable and function as intended, guaranteeing that a suitable explanation of its decision-making process can be provided along all the MR-IEWS process**. Moreover, the **GOBEYOND** systems using AI algorithms will be devoted to **support situational awareness about the hazards and potential impacts in official emergency management centres operated by CPAs and first-responders**.

Finally, **GOBEYOND** supports AI-innovation ecosystems as one of the best ways to promote innovation. To that end, the project will promote interdisciplinary and multi-stakeholder AI research, through regional-scale challenge-driven research pilots interconnecting all parts of the AI-ecosystem in geo and weather risk management.

1.3. Integrating gender dimension from the proposal’s design

Gender mainstreaming, meaning integrating a gender equality perspective at all stages, is a **transversal priority addressed throughout GOBEYOND** in designing the full proposal, the WPs and the proposed tasks. Firstly, the consortium is highly diverse on multiple dimensions, comprising a mix of genders, nationalities, ages, disciplines, and types of organisations. Furthermore, addressing disaster risks in contexts of inequality requires a deliberate effort to ensure that the voices of the most vulnerable groups are heard and included in the project **LLs**. For example, analysing how gender differences translate into differential vulnerability and exposure to extreme events among men and women, including differential (gendered) mortality rates following disasters ([Neumayer and Plümper, 2007](#)), more severe impacts of heatwaves on women ([McCall et al 2019](#)) and higher incidence of domestic as well as sexual and gender-based violence in times of climate-related hardship ([Anastario et al. 2009](#)). Also recognising gender barriers is necessary, as women’s active contributions to the field of disaster governance have been often overlooked ([Bradshaw, 2014](#)). Throughout **GOBEYOND**, and particularly in the **LL** meetings, attention will be paid to (i) the extreme vulnerability such as increased insecurity, restricted mobility, and livelihood responsibilities that women disproportionately face during disasters; (ii) women’s leadership in crisis response as a crucial part of community resilience; (iii) empowering women and ensuring that women’s needs are appropriately addressed in disaster response plans, and (iv) the inclusion of gender experts in disaster management leadership.

Next, **GOBEYOND** aims to deliver gender-inclusive project results, deliverables and outcomes, and gender sensitivity is strongly embedded in the work plan through the **LLs** design and data collection and analysis. Specifically, in the **LL** sessions, we will develop gender-sensitive perspectives on CCA and community resilience, meaning that we will (i) seek inclusive strategies and approaches, (ii) adopt gender-sensitive perspectives in data collection and analysis and the presentation of outcomes, (iii) estimate the impacts of the research in **GOBEYOND** on gender and ethnicity (intersectionality) in relation to vulnerability.

Finally, the project gives great importance to tackling inequalities and promoting gender equality. Beyond the European Policy of equal opportunities between genders in matters of employment and occupation, **the Consortium is fully committed to deliver gender-inclusive project results, deliverables and outcomes**. Thus, **GOBEYOND** is designed to contribute to a gender-equal Europe and aligns with the EU Gender Equality Strategy 2020 and SDG5.

1.4. Data Management Plan

The data generated and/or collected during the project will be managed following the **GOBEYOND Data Management Plan (DMP)** to ensure that all research data will be findable, accessible, interoperable and reusable (**FAIR**) accordingly with the [European data strategy](#) and the **ECs Open Science principles**. The **DMP** will include guidelines for collecting, generating, processing, storing, handling and sharing all data produced during foresight, research, testing, validation and dissemination activities according to “**open as possible, as closed as necessary**” principle. The **DMP** will define methods and standards to be applied, access rights, data curation and preservation rules. All data accessible through login on the project website and data management platform will be stored in conformity with Intellectual Property Rights (IPR), and the new General Data Protection Regulation (GDPR), which require data collection and management to be lawful, fair and transparent. A first version of the **DMP** will be presented as Deliverable **D7.1 in M06 (T7.1)**, and it will be revised and updated at least at the end of each reporting period, being a dynamic document, regularly updated by the Coordination Team and reviewed by the Executive Board adapting it to the changes in the relevant National and EU Regulatory frameworks and changes in the consortium and grant agreement. If necessary, **DMP** will also be authorized by national authorities.

1.4.1. Data collection and management

The data collected and generated in **GOBEYOND** will consist of: Existing knowledge on science, technologies, practices and policies related to different aspects of weather and geohazards EWS across Europe (**WP1**); Stakeholders’ and research participants’ perspectives and opinions on different aspects of **MR-IEWS** tools gathered through formal interviews, surveys, and dedicated website to support the co-creation sessions in the **LLs** of the project (**WP2** and **WP5**); Data about the usability and performance of the DSS tools developed in **WP2, WP3** and **WP4** collected in 6 **demonstrations (WP5)**; Data from the interactions taking place in the activities of the **CoP**, Workshops and training sessions in the form of written notes and audio transcriptions of discussions among stakeholders and participants (**WP7**).

GOBEYOND will set up a platform for effective storage of all the collected data and their metadata. Data will be processed and stored in an ethically justifiable, privacy-preserving and secure manner. The data management platform will be based on open-source software CKAN and accessible through a secured portal. Data published in CKAN will be openly available, unless data owner restricts it, and connected to a general-purpose Open Science repository (see Section 1.5). Data collection and management protocols will be based on existing standards, like the *Dublin Core Metadata Initiative*. Official thesaurus used in natural hazards and disaster risk domains (e.g., [SFDRR](#), UCL EM-DAT, etc.) will be used. Geospatial data will compose part of the **GOBEYOND** research data and will comply with the [INSPIRE directive](#).

1.4.2. Personal data protection, Privacy and Security

The research to be carried out within the **GOBEYOND** project also involves activities with adult human volunteers, surveys and data collection activities. The volunteers, SM and Crowdsourcing surveys will follow well-established ethical principles and guidelines, including **informed consent, privacy by design, and secure data management** defined in close collaboration with the privacy, legal and gender experts of the Consortium. Only the minimal amount of personal data needed for research objectives will be collected, strictly compliant with the relevant regulations and all datasets will be duly anonymized. The data will be stored in secure and encrypted servers at UPC or certified data centres located in the EU, ensuring privacy and security. Raw data will be deleted from the servers after the completion of the project, unless the EU and the project consortium agree otherwise.

1.5. Open Science and Citizen Science

The project is committed to the principles of **inclusion, fairness, equity, and sharing** and to increase accountability and reproducibility of research. Particularly **GOBEYOND**, through its DMP, will publish all relevant research data into a general-purpose Open Science repository (e.g. [UPCCOMMONS](#)) and all relevant research results will be published with a unique digital object identifier (DOI). Other data sharing platforms will be used in the dissemination ([JRC Open Data portal](#), [DRMKC](#), [Humanitarian Data platform](#), Copernicus Climate and Atmospheric Data Store etc). The **GOBEYOND Data Management website** will be connected with the [European Open Science Cloud \(EOSC\)](#) to support communities of practice and research in DRM, resilience-building and CCA.

All the scientific publications will be freely and widely accessible and deposited in open repositories with DOI. Beneficiaries shall deposit an electronic copy of the published version or the final manuscript accepted for publication. Scientific journals with no “embargo periods”, and, when possible, in gold open access will be used. However, as an IA project, the publication of results will consider the plans to protect **IP** and exploit **KERs**. Finally, the research (data collection and analysis) in **GOBEYOND** is guided by concepts of citizen science and ‘diversity by design’. Thus, the project will promote Citizen science and practices for public participation and collaboration in scientific research

(McCormick, S., 2012; Bonney et al., 2014), crucial aspects to be considered in the pilot site LLs for capturing the participation and competencies among first responders and local citizens.

2. Impact

2.1. Project pathway towards impacts

The proposed **pathway to impact** is based on the development, implementation and demonstration in operational environment of the **GOBEYOND MR-IEWS platforms** (see **Figure 6**). These solutions represent a unique contribution to impact addressing **all 5 Topic Expected Outcomes (EOs)** and **all 4 DRS Destination Expected Impacts (EIs)**. Additionally, **WP7** is designed to **maximize impacts** during the life-time of the project through the implementation of the Communication, dissemination, and exploitation activities (see Section 2.2). Moreover, the **GOBEYOND Adoption Accelerator Program (AAP)** in **WP6** is designed to **continue providing impacts beyond the end of the project**, promoting the adoption of the **GOBEYOND MR-IEWS platforms**, and **contributing to the EIs by 2030 in a relevant way**. The contribution and credibility of this **Impact Pathway to achieve the EOs and EIs** are defined in the next section, and their **scale and significance** quantifying the impact with specific, measurable and meaningful key performance indicators are compiled in **Table 3**. The **requirements and expected barriers** for achieving them are identified in Section 2.1.5.

2.1.1. GOBEYOND unique contribution to the topic Expected Outcomes (EOs)

The topic call text includes **5 Expected Outcomes (EOs)**, and requests that Projects contribute at least to three of them. As it is expected that **only one project will be funded** in this CL3-2022-DRS-01-05 call, and recognizing the importance of all these EOs, **GOBEYOND has been designed to provide relevant contribution to ALL 5 EOs**.

EO1: Comparison of measures and technologies to enhance the response capacity to extreme weather and geological events (including local measures and warning systems) affecting the security of people and assets.

WP1 is entirely devoted to achieve this **EO1**. Being **GOBEYOND** an Innovation Action, the purpose is not to propose a new literature review of the Impact-based forecasting advancements in the different hazards, but to use those already published (e.g. [Merz et al, 2020](#)) to **compare and benchmark their skills, TRLs and their capacities to be integrated into an operational geo and weather Multi-Risk platform**. This work will provide the framework of **what is feasible to be done at present, guiding the co-design activities (WP2)** and providing directions to the developers to propose the most innovative, but realistic, specifications for the platforms and DSSs to be developed in **WP3** and **WP4**.

Particularly **T1.4** will perform a benchmarking analysis of the available technologies to enhance the response capacity to geo and weather events and provide a recommendation about which to be integrated in the **GOBEYOND** platforms. Deliverables **D1.1, D1.2, D1.3** will achieve this **EO1**.

EO2: Adjustments of warning and response systems in the light of cross-disciplinary cooperation, involving planning authorities and first responders, to better manage the rapid deployment of first responders and communication to citizens in vulnerable areas in the case of extreme climate events or geological disasters.

WP2 is entirely devoted to achieve this **EO2**. All the **6 project pilot sites** will organize **participatory approaches to co-design the proposed IEWS and DSSs**, engaging **Civil Protection and planning authorities, first/second responders, research, developers and representatives of the civil society** following the **Quadruple Helix** approach. In the case of the **3 EU regional pilots**, this participatory approach will be based in the **Living Lab** framework (see 1.1.2.5), and co-creation sessions with institutions representing all relevant actors will be animated by the leading pilot-site partner (**EPCA, ATT and POZZ**). This collaborative approach will be key in **WP2 to identify and formalise the needs and requirements of the responders and authorities** in the framework of "feasible" solutions identified in **WP1**. This effort will also be extended to the operational demonstrations, in **WP5**, ensuring the co-evaluation of the implemented systems and of the results obtained. Providing valuable feedback to the developers to improve the warning systems and the tools to support response management to fully achieve **EO2**.

Deliverables **D2.2** and **D2.3** will achieve this **EO2**, providing the technical specifications required in **WP3** and **WP4**.

EO3: Timely operational forecasts of severe (short-term focus) extreme weather events (e.g. floods, hot waves, storms, storm surges) **or geological hazards** (e.g. volcanic eruption, earthquake, tsunami) **to aid planning authorities, civil protection agencies and first responders in their decision-making**.

Supporting planning authorities, civil protection agencies and first responders in their decision-making and response during geo and weather emergencies is the main objective of **GOBEYOND**. To ensure this achievement, **WP3** and **WP4** have been designed to **integrate innovative real-time impact-based forecasting algorithms for geo and weather hazards** into an innovative **MR- IEWS platform**.

To produce the required **timely operational impact forecasts** **GOBEYOND MR-IEWS** will be composed of a common

Processing Core (T3.1) able to run the selected **AI algorithms (WP1/WP2)**, which will be either run in existing operational platforms or encapsulated in the [European Weather Cloud](#) facility. The generated impact forecasts will feed a "multiplicity" of front-ends to respond to the different needs of international, national, regional and local CPAs and first responders through a highly customized **Decision Support System (DSS) (WP4)**. These regional/local DSSs will be highly configurable and adaptable to the requirements of different locations, and will offer **real integration of the most advanced Impact-based forecasting algorithms for geo and weather hazards with high resolution vulnerability, exposure and risk information**. They will also incorporate the capacity to produce **Site Specific Warnings (SSWs)** and advanced communication features (**T4.4**) to **support interaction between first responders and citizens** (see [Figure 5](#)). The **WP5 demonstrations in operational environment** in collaboration with pilot Emergency Management Centres (EMCs) will serve to improve the prototypes, achieving **TRLs 7 to 8** at the end of the project, ensuring **EO3** is fully achieved. Deliverables **D3.1** and **D4.4** will achieve this **EO3**.

EO4: European-scale multi-hazard platform to facilitate the identification of expected natural hazards **with great specificity in time and space and improve science communication for boosting interactions between scientists, general media and the public**.

This Expected Outcome is an **extremely ambitious challenge** as it is formulated in the text topic.

At present there are a number of EU-scale platforms **facilitating the identification of expected natural hazards and the follow up of the present emergencies** to coordination bodies as [ERCC](#) and [UCPM](#) members. The [METEOALARM](#) service, or the platform for hotline technical support offered by the [ARISTOTLE-eENHSP](#) project to the [ERCC](#), are example of these operational platforms. Also [CEMS](#) offer the **Copernicus EMS On-Demand Mapping**: a set of real time advanced tools and services providing on-demand detailed information for selected emergency situations anywhere in the world, including [Risk and Recovery Mapping](#), exposure mapping including [population and built-up surface maps](#), as well as Early Warning and Monitoring advanced tools as [EFFIS](#), [EFAS](#) and [EDO](#). However, these EU or Global scale platforms and services are **unable to provide the "great specificity in time and space" nor the required functionalities to support planning authorities, civil protection agencies and first responders in their decision-making during emergencies**, what is the main target of the Topic call. For instance, the most advanced system providing [Flood Rapid Risk Assessment](#) at present is able to provide it in aggregated form at NUTS2 scale, which **doesn't meet the requirements for supporting the deployment of the response by CPAs and first responders at regional/local scale**. Therefore, a challenging next step is required, to achieve both **EO4** and **EO3**. And **GOBEYOND** is proposing an innovative strategy able to achieve these two goals in a short developing time through a **MR-IEWS Processing Core** running the selected **AI algorithms** (selected in **WP1** and co-designed in **WP2**), feeding a "multiplicity" of highly customizable user-interfaces able to respond to the different needs of international, national, regional and local CPAs and first-responders through regional/local **DSSs (WP4)** (see [Figure 6](#)).

WP3 will develop the international scale platforms **EW4EUrope** and **EW4MED** that will be demonstrated in operational environment in **WP5**. Deliverables **D3.2**, **D3.3** will achieve this **EO4**.

EO5: Methodologies to integrate innovative state-of-the art early warning systems into existing tools for decision-making and situation reporting already used by civil protection authorities from international to local level.

Again, this Expected Outcome is an **extremely ambitious challenge** as it is formulated in the text topic, since there is no at present any EWS able to seamless provide useful support to **civil protection authorities from international to local level**. And again, **GOBEYOND** is proposing an innovative strategy to achieve it.

First **WP2** will establish the co-creation framework in which to identify the needs and formulate the specifications for the developments in **WP3** and **WP4** together with the partners and stakeholders involved in the demonstrations (**WP5**). Specific attention will be devoted to ensure that the innovative products, methodologies and platforms **can integrate/work with the existing tools for decision-making and situation reporting already used** and can be compatible with the legacy systems. Essentially the proposed **DSSs** will be built on and improve the existing tools and services as **GIN** in Switzerland; **Vigirisque** platform in Morocco; **WIKI-predict** platform at **SMI** for the Nice conurbation, etc. On the other hand, the international platforms proposed (**EW4EUrope** and **EW4MED**) will be designed as integrators able to connect to the existing webservices and databases providing the required data, that will be the input for the **GOBEYOND MR-IEWS Processing Core**. Which will be able to serve the products through its own webservices, allowing them to be used not just by the proposed **DSSs**, but also for any existing tool already used regional and local authorities and first responders. Additionally, **T4.3** will be entirely devoted to add **tools to support multi-level coordination**, as this **EO5** requires. Finally, the **6 operational demonstrations** run in **WP5** will show that this **EO5** is achieved in a multiplicity of regional and local different environments, including Switzerland and Morocco, ensuring that **GOBEYOND MR-IEWS** can be proposed as an efficient solution **from international to local level everywhere in the EU and beyond**.

2.1.2. [Contribution to the Expected Impacts \(EIs\)](#)

The **CL3 Destination DRS** requests to set out a credible pathway to contribute to **4 EIs** of the HE Strategic Plan. **Table 3** summarizes how the **GOBEYOND MR-IEWS platforms** contribute to each of these wider **EIs**.

(EI1) Enhanced understanding, improved knowledge and situational awareness of citizens, empowered to act raising the resilience of European society:

GOBEYOND MR-IEWS platforms are mainly developed to increase situational awareness and support rapid deployment of authorities and first responders. However, a significant effort will be done in adding advanced communication capacities to the systems, and particularly to include **Site-Specific Warnings, as the most efficient way to improve the efficiency of IEWS (T4.4)**. Thus, through these SSWs co-designed at local level and through their ability to trigger specific actions (even to be done by the population) pre-defined in the local Self-protection plans, the proposed systems will be able to transform citizens in “assets” for integrated geo and weather DRM. What will be a significant long-term impact of the **GOBEYOND MR-IEWS** platforms, and a major contribution to this EI1.

(EI2) More efficient cross- sectoral, disciplines, border coordination of the DRM cycle from international to local levels: **GOBEYOND** supports a better coordination of the DRM cycle through the use of advanced MR-IEWS, co-designed through participatory approaches and LL sessions with cross-sectoral and cross-disciplines multi-stakeholders (WP2). It also provides multi-level and cross-border coordination since it is based on Pan-European/Mediterranean impact forecasting products and platforms (WP3). The capacity of supporting coordination between local/regional/national and EU levels will be specifically addressed in T4.3, and supported by the implementations and demonstrations in 3 EU regions, 4 EU cities, a Canton in Switzerland and a Province in Morocco (Ufm) (see WP5).

(EI3) Enhanced sharing of knowledge and coordination regarding standardisation in the area of crisis management: The MR-IEWS is designed to support multi-level and cross-border coordination since it is based on Pan-European/Mediterranean impact forecasting MR-IEWS. Also, the effort to make it work outside Europe (T3.3), its implementation and operational demonstration in 5 EU countries, Switzerland and Morocco, and the capability to be applied in any region of Europe and of the Ufm convert the **GOBEYOND MR-IEWS** in an ideal platform for coordination, interoperability and future standardization for massive deployment of MR-IEWS, supporting as well the Sendai Framework for DRR and the UN global initiative EW4ALL.

(EI4) Strengthened capacities of first responders in all operational phases to better prepare operations + access to enhanced situational awareness + to respond in a faster, safer and more efficient way (...): All **GOBEYOND MR-IEWS** platforms contribute to EI4 since they have been designed to support first responder capacities in all operational phases with better situational awareness, capacity to prepare the response, and more efficient and faster deployment. The capacity to anticipate the impacts (before to be reported) enabling a pro-active response immediately after the detection (geohazards) and even before the event occurs (weather) is a major achievement of the **GOBEYOND MR-IEWS**. The capacity to provide SSWs able to trigger community Self-response protocols (see 1.1.2.6) is a “quantic” step ahead towards a faster, safer and more efficient capacity to cope with extreme events. The capacity to co-design, demonstrate in real-time and co-evaluate these tools in operational environment is a major contribution to achieve EI4.

Additionally, Destination DRS specifically requests proposals to support international and EU DRR policies, and the cooperation with Networks of Practitioners (NoPS): **GOBEYOND's** SO6 recognizes our commitment with this support, and T7.5 and T7.7 explicitly include the cooperation with existing NoPs, the CERIS, UCPKN and DRMKC.

2.1.3. Wider impacts on the long term not considered in the Work Programme

2.1.3.1. Supporting the UN global initiative EW4ALL.

Despite the substantial R&I investments in early warning systems (EWS), a substantial implementation gap persists and the implementation of efficient EWS in the world is not progressing as required, especially in times of a changing climate. This reality has led UN and WMO to announce in 2022 the Early Warnings for All initiative to ensure that every person on Earth is protected by an early warning system in the next five years, thus grabbing one of the most effective “low hanging fruits” for climate change adaptation. The action plan of this EW4ALL initiative has been declared an international priority by the UN at COP27 (November 2022).

In this framework, **GOBEYOND** is designed to have a direct impact on this UN initiative by setting up an innovative MR-IEWS for geo and weather risks, co-designed, implemented and demonstrated in operational environment in 6 pilot sites, and ready to be deployed in any region and municipality of Europe and the Ufm African countries at the end of the project.

2.1.3.2. Supporting standardization and interoperability in EWSs

Emergency management and civil protection is one of the fields in the Security sector in which establishing standardization activities² for response, effective deployment of resources and cooperation is still a priority. This is based on the recognition of the inherent difficulties to advance in standardization and interoperability in a sector where the human factors are of crucial importance.

This implies that technical solutions should be understood as incremental step by step enablers of awareness and communication needs. On the other hand, crisis management practitioners tend to consider standardization primarily through procedures for central production and dissemination of guidance material. However, reformulation of the

² Mandate M/487 to Establish Security Standards in EU.

standardization process will significantly enhance social awareness and empower citizens to become “assets” during the response to emergencies and even act as “earliest responders in place”.

This is a challenge that needs to be **based on good practice examples** and should focus on a **concept for emergency management based more on agility than on planning**. It should concern development of good practices, not requirements for certification and, as a first idea it may follow a complementary approach to the Business continuity management standard [ISO 22301](#), which concerns both agility during response phase and preparation for agility, and assumes a good understanding of the context (organization and capabilities).

In this complex context, **GOBEYOND** wants to make a first contribution, proposing at least **suggestions of guidelines to advance in standardization and interoperability** in two aspects: (a) **Developing innovative MR-IEWS platforms**, becoming a referent in the field; and (b) **preparing recommendations and guidelines based on the 6+1 demonstrations**. The establishment of such a reference in **MR-IEWS** will boost the **development and deployment of public and private MR-IEWS services** at a stronger level than commercial intellectual property protection would do.

2.1.3.1. Development of sound and rational risk reduction supporting tools to manage low probability/high impact events

Geohazards, and specifically earthquakes, are in low probability/high impact events that cause huge damage and high number of fatalities compared to weather hazards. Thus, including **Earthquake and Rapid Response EW products** into the **MR-IEWS** co-designed to fit specific end-user needs (**WP2**) is a major step ahead, which will be implemented and demonstrated in operational environment together with other more frequent hazards (as weather events) in **6 pilot sites**. The inclusion of cutting-edge capacities such as providing real-time maps for scenarios of likely regional earthquake damage in settlements and city districts, estimates of human losses and damage to critical facilities (e.g., hospitals, schools, dams, power plants), will convert **GOBEYOND MR-IEWS** in an unprecedented development for these hazards, especially because they can be connected at regional and local scale to operational **DSSs** and be integrated in their response protocols. The demonstrations at various sites across Europe and North Africa will illustrate (even in absence of a big event) the effectiveness of risk-reduction strategies, where warnings will be integrated into the emergency plans to mitigate the risk associated to people, buildings, infrastructures and industries. The capability of broadcasting EEW alerts to the general public (**T4.4**) will be a relevant tool to mitigate the seismic risk at large scale. Both actions track an efficient path to significantly improve the societal resilience during earthquakes, and will maximize the project impacts in the long term.

2.1.4. Scale and Significance

The **GOBEYOND MR-IEWS platforms** and activities are designed to deliver long-term impact and contribute to the Topic **EOs** and Destination **EIs**, generating **societal, economic, technological, and scientific impacts**, beyond the 5 regions and 4 municipalities in which the demonstrations (**WP5**) will run. The estimated **scale and significance of the project achievements** are summarized in **Table 3**.

Table 3: Scale and Significance of the GOBEYOND MR-IEWS platforms’ contributions to the Topic EOs and Destination EIs.

Achievements: Expected results	Scale	Significance
<i>What is generated by the end of the project?</i>	<i>How widespread impacts are to be?</i>	<i>Importance, or value, of the benefits</i>
GOBEYOND MR-IEWS Processing Core: • MR-IEWS Processing Core prototype (D3.1) Contribution to EO1, EO2, and EO3	• Methodological framework to incorporate new impact forecasting algorithms in a MR-IEWS platform • MR-IEWS Processing Core products demonstrated in 6 pilots	Scientific: • > 12 AI Algorithms to provide Impact forecasts for 9 hazards (Table 1) operationally running. • > 25 scientific publications on Impact forecasting algorithms (> half of in ANYWHERE) Social: • > 21 M inhabitants served at the end of the project ³ Economic: • for every Euro invested a return of 159 Euros is created after 20 years of operating advanced EWS
GOBEYOND MR-IEWS EW4Europe platform: • MR-IEWS EW4Europe prototype • Operational implementation of an MR-IEWS platform on the	• MR-IEWS platform ready to support any CP authority in any UCPM member state	Scientific: • Interactive, scalable co-designed decision support tools that are fit-for-purpose • > 2 scientific publications on use of MR-IEWS in Life-test case studies out of the pilot sites (T5.9)

³ Population covered estimated as: Andalusia (ES61): **8,4M**; Campania (ITF3): **5,8M**; Attica (EL30): **3,8M**; Province of Al Hoceima (Morocco): **0,4M**; Swiss Canton (CH): **0,8M**; Nice agglomeration: **952k**; Setúbal District (PT170): **850 k**; Pozzuoli city (IT): **82 k**; Piraeus City (EL): **176k**; Estepona City (ES): **67k**.

pan-European scale (D3.2). Fully compatible and interoperable with existing CEMS services Contribution to EO3		<u>Social:</u> - MR-IEWS platform ready to support international, and cross-border coordination in geo and weather emergencies. <u>Economic:</u> - Impact-based forecasts of the potential losses, leading to better informed decisions of actions
GOBEYOND MR-IEWS regional and municipal platforms MR-IEWS prototype for first responders (D4.4) - Operational implementations in 3 EU regions, one Swiss Canton and a Province in Morocco Operational implementations in 4 EU cities Contribution to EO2, EO3, EO3 and EO5	Methodology, guidelines and recommendations to implement it in any interested region and municipality in EU and UfM	<u>Scientific:</u> 5 regional prototypes and > 7 local prototypes > 5 scientific publications on the use of DSSs at regional/local scale <u>Social:</u> - improved support to situational awareness for first responders and regional/local CPAs. <u>Economic:</u> - Interactive, scalable co-designed decision support tools that are fit-for-purpose ready to implement in regions and municipalities in Europe and UfM
GOBEYOND MR-IEWS EW4MED platform MR-IEWS EW4MED prototype (D3.3) Operational implementation in 1 region in Morocco Implementation & testing at. Contribution to particularly EO3, and EO5	MR-IEWS platform ready to support any CP authority in any UfM country. - Methodology, guidelines and recommendations to implement local version in any interested country/region of the UfM.	<u>Scientific:</u> - MR-IEWS knowledge, tools and guidelines - Feedback and recommendations from pilot-site authorities, stakeholders and communities (D5.3) <u>Social:</u> - improved support to situational awareness for first/second responders and disaster risk management authorities. - Implementation & testing at national (Ministry of Interior), regional (Provincial authority of Al Hoceima) and local scale (municipal Civil Protection and Gendarmerie Nationale) in an UfM country. - contribution to the Target G of the SFDRR, and the UN/WMO EW4ALL initiative. <u>Economic:</u> - Identification of regional and local needs to propose efficient market uptake and adoption actions. - Opening a market of services beyond EU countries
GOBEYOND Pilot Sites: - Implementation & testing in 3 EU regional pilots and in 4 EU municipalities (T5.3 -T5.6) - Implementation & testing in 1 Swiss canton and one UfM regional pilot (T5.7 -T5.8) 3 demonstration workshops (M7.4, M7.5, M7.7) 2 Hands-on Training activities (M7.6, M7.7) Contribution to particularly EO2, and EO5	- Test in operational environment of the MR-IEWS platforms in 5 regional demonstration pilots, serving >19M people³. - Test in operational environment of the MR-IEWS platforms in 4 municipal demonstration pilots, serving >2,1M people³.	<u>Scientific:</u> - Documentation of process of co-design in 3 regional LLs (D2.1) - Identification of needs for training activities and wider support and guidance (D5.1) - Feedback and recommendations from pilot-site authorities, stakeholders and communities (D5.3) <u>Social:</u> - Demonstrations in collaboration with regional and municipal CPAs and first responders in 7 countries - Understanding EWS needs in diverse local conditions and risk perceptions <u>Economic:</u> - Identification of regional and local needs to propose efficient market uptake and adoption actions.
GOBEYOND Innovation Prize: - Publication of an Open Call for innovations following the procedures of FSTP Prizes in HE (T6.3) - Implementation of a complementary Impact-based algorithm/technique improving the innovation capacity of the GOBEYOND developments Contribution to EO1 and EO2	Open Call open to any EU and HE associated country SME, University, Innovation and Technological Centre	<u>Scientific:</u> - Improvement of the capacities of the GOBEYOND MR-IEWS platform with know-how external to the Consortium (T6.3) <u>Social:</u> - Project open to innovation by external partners <u>Economic:</u> - Reduced cost of implementation by sharing a common MR-IEWS platform and iterative learning
GOBEYOND Community of Practice: A Community of Practice for MR-IEWS supporting improved	>50 CoP stakeholders participating in the activities	<u>Scientific:</u> Feedback and recommendations from pilot-site authorities, stakeholders and communities (D5.3) <u>Social:</u>

response during geological and weather/climate events (T7.5) • 3 demonstration workshops together with the CoP and CERIS (M7.4, M7.5, M7.7) Contribution to EO1, EO2, and EO5 and EI1	• Engagement of larger Community of Practice by demonstration workshops (M7.4, M7.5, M7.7)	• Improved awareness on citizens and risk management professionals on the use of MR-IEWS, SSWs and local Self-Protection plans <u>Economic:</u> • Reduced cost of MR-IEWS implementation by sharing best practices and iterative learning • >3 consultancies and enterprises engaged and ready to replicate the MR-IEWS implementation • Opening a market of services with >10 additional regions and >20 municipalities ready to adopt GOBEYOND MR-IEWS
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2.1.5. Requirements and Potential Barriers

2.1.5.1. Resistance to adopt MR-IEWS platforms from authorities and first responders.

The design of GOBEYOND is done from the understanding of this barrier. This is why the proposed MR-IEWS platforms are to be co-created in close collaboration with the authorities and first/second responders responsible of emergency response in 6 pilot demonstrations. This is a pragmatic way to understand the needs in a variety of regions and municipalities (with different hazards, risk perceptions and response capacities) ensuring a flexible design able to facilitate regional and local adaptation and adoption, and thus generating the required trust.

2.1.5.2. Lack of required data on exposure and vulnerability to provide risk SSWs

In some locations may be difficult to access the data on exposure and vulnerability with the detail required to produce SSWs. Especially in the case of UfM countries, this can be even extended to data required for the impact forecasting algorithms at local/regional scales.

The involvement of committed early-adopter regional and local authorities as partners in the pilot sites guarantees the availability of the existing datasets to carry out the activities in the framework of the proposed pilot sites. To reduce the potential effect of this barrier for the extension to other regions/municipalities in the future, T5.10 will propose recommendations for the use of specific local/regional exposure and vulnerability datasets (when available) in combination with existing datasets with European and/or global coverage as substitutes of the layers not available at local/regional scale. This will guarantee the applicability of the impact assessment algorithms and promote the adoption of the GOBEYOND developments.

2.1.5.3. Capacity for Adoption and Local Needs by Authorities:

The EU society needs to have the capacity to incorporate technology to activate self-protection protocols and risk management plans to react effectively during geo and weather emergencies. One of the main obstacles is access to funding and the difficulties in the application of the procurement instruments. T6.2 will focus on developing a scaling and adoption roadmap as part of the plan to prepare interested region and cities for adopting the GOBEYOND MR-IEWS platforms before the end of the project. Activities to showcase the demonstrations as successful stories proving the value of the platforms will be carried out (WP7). The successful example of A4IRL in Ireland, based in the ANYWHERE project, will be analysed as a pathway to overcome this barrier (procurement of a Multi Hazard Early Warnings System -MHEWS- for Ireland at national scale, based on the ANYWHERE A4EU MHEWS platform issued by Met Éireann without being partner).

2.2. Measures to maximise impact

The GOBEYOND pathway to impact, based on the adoption and market uptake of the proposed MR-IEWS platforms, include two full Work Packages that are devoted to maximise impact: WP7 will develop an extensive Communication and Dissemination Plan (D7.2) and a number of activities for engagement and knowledge transfer to all identified target groups (see Section 2.2.1); WP6 will develop the Exploitation and Market uptake Plan as part of the AAP (T6.1) ensuring adoption and scalability of the GOBEYOND MR-IEWS platforms.

2.2.1. Communication and Dissemination

The main goals of dissemination are to (i) foster engagement and active participation of all target groups, (ii) transfer knowledge to maximise the impact of the results, and (iii) provide widespread visibility of the project and outcomes. A draft outlook of the Communication and Dissemination Plan is provided below; a full version will be delivered in M06 (D7.2). It will be designed for maximum outreach (all key stakeholders will be accessed through the appropriate channels and tailored messages) and diverse involvement (co-creation, engagement, participation, knowledge transfer). An important asset of GOBEYOND is the already engaged communities participating in the 6 proposed pilot sites and the participation of 13 public authorities and 2 networks of first responders (HRT and VFDB) in the consortium. This will be enlarged with the CoP (T7.5).

Table 4: Communication and dissemination tools, channels and metrics

Communication tools / Channels	Purpose	Metrics by the end of the project
Visual Identity (M7.2)	Create a recognisable branding for all project visual outcomes, including logo, templates, font, icons, and colour palette.	1 visual identity
Website (M7.2)	Public image and branding of the project, repository of project information and results. Space to share news and all scientific outcomes. The website will be fully operational by M03 .	>3000 visits
SM: Twitter, LinkedIn, YouTube (D7.2 & D7.4)	Share updates with online audience in a more immediate way. Used to increase followers of project's activities and key outcomes, disseminate campaigns and events. Create connections and build a community.	>1000 followers collectively > 400 posts
Project videos (D7.3)	Inform all stakeholders and the general public on project's objectives, explain specific tools and showcase the demonstration sites. Snapshot videos will be used as teasers for promoting the project in social media and events.	>7 videos >10 snapshot videos >300 views/video
Scientific articles, outreach publications, policy briefs (D7.2 & D7.4)	Publish all scientific advancements to inform scientific communities. Advice decision and policy makers on best practices. Inform wider public and technical communities on project outcomes in an appealing and quick way. Distributed and presented during conferences, posted on partner's own channels for wider visibility.	>20 peer-reviewed on high-ranking journals Participation in >6 external international conferences >3 professional-reports >2 policy briefs
Project Newsletter and factsheets (D7.2)	Inform CoP and technical communities on project outcomes in an appealing and quick way. Distributed by email and SM, posted on partner's own channels for wider visibility.	>6 Newsletters and >3 factsheets (2 /1 per year after first year)
Conferences, events, Webinars, Webinars and Workshops (T7.4, T7.6)	Present updates and results of the project, invite stakeholders to test GOBEYOND MR-IEWS platforms . Receive user's feedback. Engage CPAs and first responder institutions to future uptake.	>10 Webinars and digital workshops >10 local events (in demonstration sites) 3 Project workshops >500 participants
Media interviews and press releases (T7.7)	Access wider audience citizens and volunteers, invite them to participate to demonstration and be part of CoP community. Inform wider public of the project's objectives and outcomes.	>10 interviews in TV news/ radio > 6 press releases

WP7 will ensure a wider outreach and engagement through a planned strategy and dedicated means of communication and activities (via events, articles, videos, media, news, etc.). The dissemination activities will help to activate stakeholders (including NGO and citizen associations) in the implementation of the project. Five different strategies targeting specific groups are planned:

- **Foster engagement & user feedback:** Through the **LL** co-design sessions in the 3 regional pilot sites (**WP2**), via organising brainstorming sessions between authorities, professionals and first responders. **Target group: 1st & 2nd responders & authorities.**
- **Training & capacity building:** The project will provide hands-on training to first and second responders and authorities in the use of **GOBEYOND** platforms, their added value, and new functionalities (**T5.2, T7.6**). **Target group: 1st & 2nd responders & authorities.**
- **Network leverage & build synergies:** Through (i) the **CoP** (**T7.5**); (ii) partners' networks (**HRT, VDFB** etc.); (iii) the collaboration with established **NoPs** (**T7.7**); and (iv) the demonstration **LLs** (**WP2** and **WP5**), **GOBEYOND** will boost dialogue, knowledge exchanges for improving all current practices and solutions uptake. **Target group: Scientific/technical communities, policy makers, 1st & 2nd responders and authorities.**
- **Knowledge transfer & scientific advancements:** Through peer-reviewed scientific articles, other publications, conferences, workshops and training sessions. **Target group: Scientific and technical communities.**
- **EU-wide/Global dissemination:** Through conferences, webinars, webinars (digital conferences), events, SM, press (local/national), infographics, presentations and the website. **Target group: All.**

GOBEYOND will develop its own channels and make use of established, strategic communication channels to increase reach and prepare clear and intelligible communication materials (articles, videos and publications) to translate and transfer the scientific knowledge and innovation to a wider audience (>300.000 citizens reached/beyond pilot-site demonstrations' related communication activities) and raise awareness on all topics of DRM. The figures provided as **KPIs** are based on the project [ANYWHERE dissemination results](#). The communication measures and the data collected will comply with the GDPR and will include a consideration of the social and ethical issues, e.g. privacy, human rights.

2.2.2. Exploitation of the project results

The **GOBEYOND Adoption Accelerator Programme (AAP, WP6)** will design the **Innovation Exploitation and Market uptake Plan** to exploit the main results and maximize scaling and adoption of the **MR-IEWS platforms**. This section drafts an initial Exploitation Plan. As part of the **AAP, T6.2** will develop a **scaling and adoption roadmap** using the 6 pilot sites to showcase the potential of the **GOBEYOND MR-IEWS platforms** identifying new early adopters among the **CoP** members to scale the **GOBEYOND MR-IEWS platforms** to new regions and cities with the purpose of increase the number of implementations by 2030 (see Figure 9).

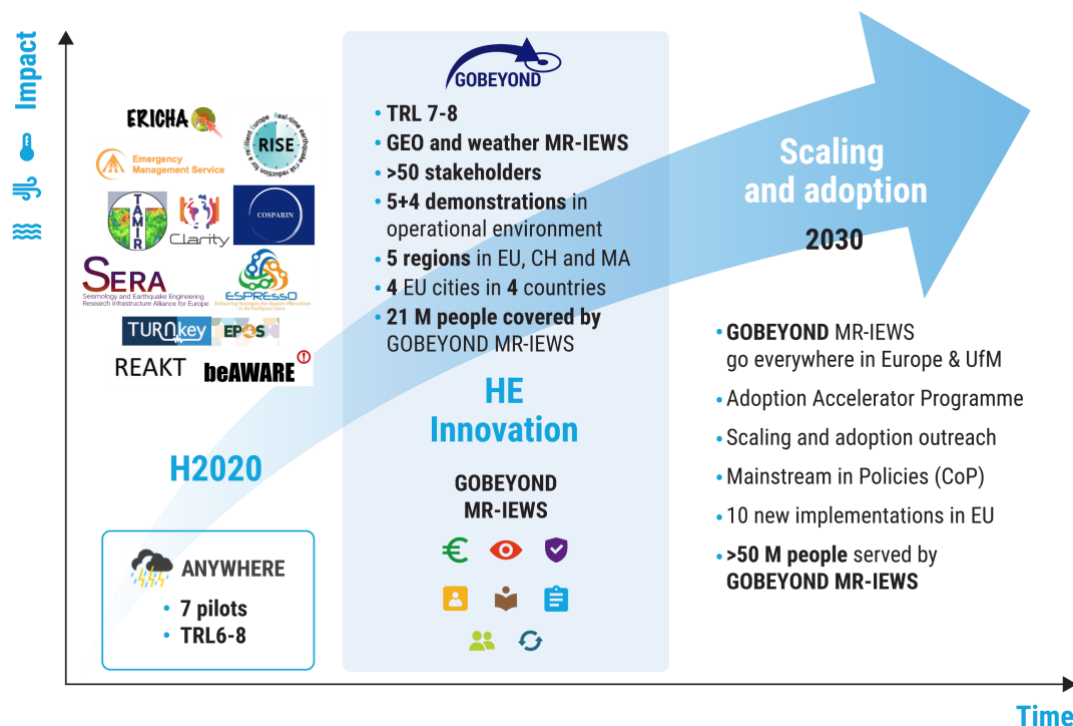


Figure 9: Pathway towards impact for **GOBEYOND**

2.2.2.1. Project Exploitation of KERs

The main **Key Exploitable Results (KERs)** are presented in **Table 5**, with a brief description, identification of main developers, and target communities and markets. **T6.1** will develop the **GOBEYOND Innovation, Exploitation, Market uptake Plan** with the identification of appropriate business models for market uptake (**D6.1** and **D6.3**) providing the general framework for the exploitation of the results of the project.

Table 5: KERs, exploitation potential, main developers and target users

KER 1: GOBEYOND MR-IEWS Processing Core	Developers:	Targeted users:
The GOBEYOND Processing Core will include all Impact forecasting algorithms for the different geo and weather risks that will power the MR-IEWS platforms. At the end of the project it is planned to offer a license to CEMS to incorporate them into their services.	ECMWF, UPC, UNINA, BRGM, NOA, MCH, ICES, PREDICT	National authorities, regional and local CPAs, 1 st and 2 nd responders, and service providers.
KER2: GOBEYOND MR-IEWS EU platform: EW4Europe	Developers:	Targeted users:
Platform for international and pan-European Coordination purposes. Able to cover regions in which there will not be dedicated MR-IEWS. Entry level for regional CPAs to test MR-IEWS products and functionalities.	HYDS	National CP authorities, UCPM , ERCC
KER3: GOBEYOND MR-IEWS EU platform for UfM: EW4MED	Developers:	Targeted users:
Platform for international and global Coordination purposes. Able to cover regions in which there will not be dedicated MR-IEWS. Entry level for regions in UfM countries, and base platform to develop a global version for the UN/WMO EW4AI initiative.	PREDICT	National, regional and local authorities in UfM and beyond
KER4: MR-IEWS DSS for regional first responders and CPAs	Developers:	Targeted users:
Platform for regional management of geo and weather emergencies. Able to provide impact-based forecasts and multi risk Site Specific Warnings at regional scale and support decision making and response deployment.	HYDS, PREDICT, DRAXIS	Regional CPAs, planning authorities, 1 st and 2 nd responders
KER5: MR-IEWS DSS for local first responders and CPAs	Developers:	Targeted users:

Platform for local management of geo and weather emergencies. Able to provide impact-based forecasts and multi risk Site Specific Warnings at municipal scale and integrated them into Self-Protection and risk management plans to support decision making and response deployment	HYDS, PREDICT, DRAXIS, BRGM	Municipal CPAs, planning authorities, 1 st and 2 nd responders
KER6: Methodologies to implement local Self-protection protocols	Developers:	Targeted users:
Methodologies to implement Self-protection protocols and risk management plans tested in the 4 pilot cities. Support for implementing MR-IEWS in European and UfM cities. Base for promoting global adoption.	UPC, UNINA, PREDICT, HYDS, DRAXIS	Civil Protection and planning authorities at local and regional scales

2.2.2.2. Target Markets and individual exploitation interests

The intended and therefore target users are regional and local civil protection and planning authorities, first responders, national and regional meteorological, geological and hydrological services. As they are, depending on the country and the mode of governance, those traditionally in charge of the implementation of **IEWS**. Companies for their own needs could also be targets and users in order to improve their **DRM** (prevent economic losses, employee's safety, etc...).

As part of the **UN initiative Early Warnings for All**, calls for initial new targeted investments between 2023 and 2027 rise up to US\$ 3.1 billion and emphasises the need to achieve early action, providing an excellent momentum for the **GOBEYOND** results market uptake. **Table 6** summarizes the individual exploitation interests identified at the moment.

Table 6: Individual exploitation interests by category of partners

Partners	Individual Exploitation Interest
Regional and local Authorities (include first and second responders):	Integrate the adapted MR-IEWS into their governance strategies and emergency response systems. Region and cities can benefit from high-quality site-specific information for decision making and risk management, via a integrated system of information. The cities are key examples of good practice to serve as a template to roll-out in other local authorities.
National CP, planning and operational Authorities, First and Second Responders:	The validation of new strategies and methodologies will provide innovative technical support to authorities, increase the effectiveness of the national systems and bring all relevant stakeholders together. MR-IEWS will increase the visibility and credibility of the warnings provided by the agencies, reaching end-users in a faster, user-tailored way and enhancing internal cooperation, and enhance coordination between regional-national-international scales.
Civil Society & NGOs:	MR-IEWS are a key tool to move from a reactive approach to a proactive, resilient, inclusive and sustainable approach. They benefit from the participants' high level of expertise in the topic and the proper connection between technology and citizens' needs in terms of safety and resilience. They will increase the sustainability of the tools through their valuable feedback and the co-development to ensure tools are fit-for-purpose.
Research organisations:	Benefit from the expansion to new contexts of geo and weather hazards, moving from MH to MR, facilitating extensive networking, talent acquisition and opportunities to lead innovative research. They play a central role in exploiting and democratising the information through new publications in peer-reviewed journals and contributing at international conferences and events. For academia, this leads to improved teaching and to form a new generation of students in DRM and MR-IEWS.
Enterprises:	Add new products and services and tools to their portfolio of solutions in all aspects of DRM and resilience building. They will benefit from increased use and extended applicability of their products and capacities in DRM. The acceleration programme is part of the long-term strategy for the partners to expand beyond the end of the project to support more cities and regions in continuous innovative ways.

2.2.2.3. Individual partner exploitation plans: benefiting their organisation

SMEs and enterprises participating in **GOBEYOND** (also through the **CoP**) will boost their exploitation capabilities through an integrated market uptake framework in **GOBEYOND**. Exploitation plans will take advantage of key actions planned on **WP6**: the **AAP** (defining a consistent business plan for EU and beyond), the **Scaling and adoption roadmap** (approaching most interested region and cities to build a first base of customers), the **Open Call Prize**, to open the **MR-IEWS** to new leading SMEs and solutions. Existing market experience from these companies (already providing EWS services) will allow to reduce the time to market and provide real market opportunities even during the progress of **GOBEYOND**. The expected impact in 2030 is to have a significant increase of turnover related to **IEWS** services for these companies (between 5 to 10 multiplicative factor). Next paragraphs summarize some strengths of **GOBEYOND** partners that can help to enhance the market uptake of the project results.

PREDICT, which is working in the field for 16 years, serving to more than 20k French local and regional authorities as well as to foreign state authorities within the framework of public contracts and financed by development agencies such as the World Bank, the Inter-American Development Bank, the AFD, the ESA, or the European Commission. It knows how to respond to the needs, to design appropriate solutions and to mobilise the players on **IEWS** topics.

HYDS is already running a platform for MH-IEWS which is providing IEWS services in the EU territory, as well as regional and local services in Spain and Ireland. Besides **WP6** actions, at present **HYDS'** market strategy is focused on consolidating these regions with additional CPA customers. **GOBEYOND** will provide the framework to **migrate from MH-IEWS to MR-IEWS** and extend **HYDS** services globally with new capabilities over other markets and regions.

DRAXIS is actively working with CPAs in Greece. **GOBEYOND** will broaden its portfolio of services and acquire new clients. More specifically the **GOBEYOND** solutions will enrich the security domain branch and will provide new services to the relevant Greek Civil Protection Authorities.

2.2.3. Management of the Intellectual Property Rights (IPR)

GOBEYOND partners will develop a precise joint agreement on IPR issues, which will be included in the **Consortium Agreement (CA)** to be signed by all the partners before the signature of the Grant Agreement. The **CA** will include explicit rules concerning IP ownership, access rights to any Background and Foreground IP required for the execution of the project, and the measures to protect of IPRs and confidential information.

2.2.3.1. Background and Foreground IP and access rights during the project

The partners agree to grant royalty-free access to Background and Foreground IP during the execution of the project. All the partners will declare any Background IP they are willing to submit to the project in the **CA** before the project starts. Another key success factor will be the access rights to the relevant data provided by the NHMSs, the Civil Protection authorities and other operational authorities intended to be used in the project. **GOBEYOND** will sign agreements with those partners providing data, and access and use of these data will be regulated by the Data Management Plan to guarantee that the limitations set by the data providers are respected.

2.2.3.2. IP ownership and applicable regulation

Each partner will own the IP of the Foreground the partner has produced. Foreground IP created jointly by, at least, two project partners whose specific contributions cannot be distinguished will be jointly owned by them. The same shall apply to inventions made by two or more project partners. The consortium will create and keep updated a **Map of Ownership and IPR of the developments**. The consortium is aware of the regulations governing participation in Horizon Europe and of the guidance published on IPR issues. It will take account of them (and seek assistance as required from the IPR helpdesk) in the construction of the Consortium Agreement.

2.3. Summary of impacts for the five outcomes stated in the call.

Specific Needs		Expected Results	Dissemination & Communication Measures (WP7)
- Identify and select the most innovative technologies to enhance the response capacity to extreme geo and weather events Adjust EWS involving planning authorities and first responders - DSSs to better manage the rapid deployment of first responders and communication to citizens in vulnerable areas Timely operational forecasts of severe geo and weather events to support CPAs & 1st responders European-scale multi-hazard platform to facilitate the identification of expected natural hazards - Improve science communication for boosting interactions between scientists, general media and the public - Integrate innovative EWS into existing tools for decision-making already used by CPAs - International cooperation with South Mediterranean members of the UfM - Cooperation with UN EW4ALL initiative		Identification and benchmarking of the most innovative methodologies and technologies to respond (D1.3). Participatory approach and LL Co-design Framework for MR-IEWS specifications (D2.3). MR-IEWS common processing core (D3.1). EW4Europe platform (D3.2) for improved situational awareness. EW4MED platform for UfM countries (D3.3). DSSs for regional and municipal CPAs and first responders (6 demonstrations) (D4.4). SSWs able to trigger Self-protection protocols empowering citizens to become "assets" (T4.4 and D4.4). 24/7 operational demonstrations in Andalusia, Attica, Campania and Switzerland (T5.3-5.5), and in Morocco (T5.6). 24/7 operational demonstrations in Estepona, Setúbal, Nice, Pozzuoli and Piraeus (T5.8). Life test of the capabilities of MR-IEWS in unplanned event (T5.9). - Prize for innovative complementary solutions (D6.2). GOBEYOND Community of Practice (CoP) with >50 stakeholder institutions. (T7.6).	GOBEYOND Dissemination & Communication tools (website, videos, social media). GOBEYOND operational Demonstrations: 6 pilot sites demonstrations in operational environment led by early-adopter regional and local authorities and first responders testing and showcasing the developments. GOBEYOND Workshops: 3 two-day workshops with the participation of members of the CoP (including experts, public authorities, policy-makers and citizen associations). GOBEYOND Hands-on Trainings: 2 two-day training activities with the participation of members of the CoP. Dissemination activities in the pilot sites (see Table 4). - Publications (scientific and professional). - Participation in Conferences, workshops and local dissemination events.
Target Groups		Outcomes (medium-term)	Impacts (long-term)
1. Civil Protection and planning Authorities		Deployment of the GOBEYOND MR-EWS platforms . 6 demonstrations in EMCs in operational environment. EO2, EO3, EO5 . (SO1, SO2, SO3, SO4, SO5 and SO6)	Societal: Delivering collective benefits through cooperation, coordination, better response, and decision making for more effective and faster response and deployment. Economic: Leveraging long-term investment in MR-IEWS and response to natural hazards through private sector involvement. EI2, EI3, EI4
2. 1st & 2nd responders		Improved response and situational awareness support. DSSs with advanced communication capacities. MR-IEWS Integrated in existing used protocols. EO2, EO2, EO3, EO4, EO5 . (All SOs)	Social/technological/economic: Reduced widespread loss of life, livelihoods, infrastructure, and assets due to more effective planning and response to geo and weather events. Creating better working conditions for first responders and enabling better preparedness to reduce economic losses. Scientific: Strengthened human capital and access to the state-of-the-art technology and tools for MR-IEWS . EI2, EI3, EI4
3. Citizens and communities		Co-design and take co-responsibility for DRM planning. Adoption of the MR-IEWS with SSWs able to trigger actions during geo and weather events. EO2, EO4 . (SO1, SO2, SO3 and SO5)	Societal: Strengthening capacity, knowledge, and uptake of self-protection protocols by citizens and vulnerable communities, reducing risk. Economic/Technological: innovative MR-IEWS tools to inform and activate citizens to act and avoid damage and loss of livelihoods and assets. Scientific: new knowledge from a citizen-perspective and community-engagement for better anticipation and planning. EI1
4. Scientific & technical communities		Geo and weather MR-IEWS reach TRL 7-8 with increased user acceptance. Boosted multi-disciplinary collaborations. EO1, EO2, EO3, EO4 . (All SOs)	Scientific: Creating high-quality, multi-disciplinary knowledge for Impact forecasting in geo and weather disasters from a transnational perspective. Widely distributed new knowledge. Upskilled workers and researchers in MR-IEWS. EI2, EI3
5. Policy makers		>50 multi-discipline international, organisations working in collaboration. MR-IEWS ready for Europe and UfM EO1, EO2, EO4 EO5 . (SO1, SO2, SO3, SO4, SO5)	Societal: Delivering innovative and integrated participatory approaches and solutions to improve dialogue and cooperation among all stakeholders. Addresses EU policy objectives including support to UN EW4ALL initiative , SFDRR , SDG 13 , EU CCA Strategy and Article 7 of the Paris Agreement . EI2, EI3

3. Quality and efficiency of the implementation

3.1. Work plan and resources

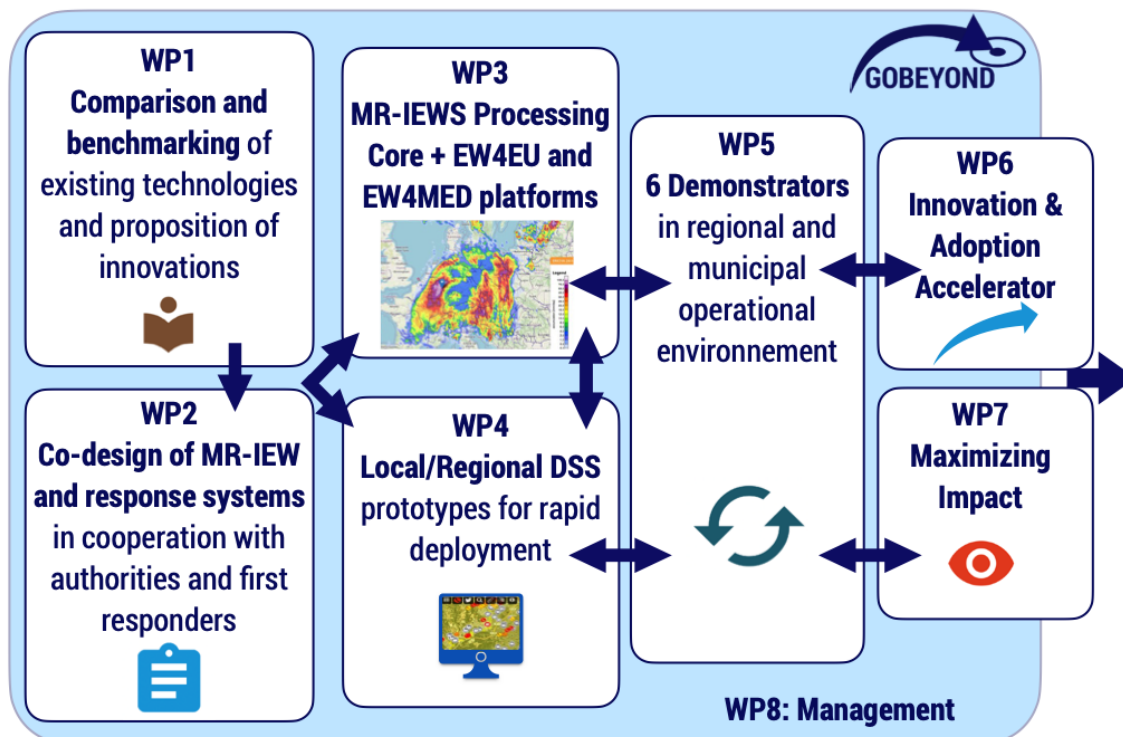


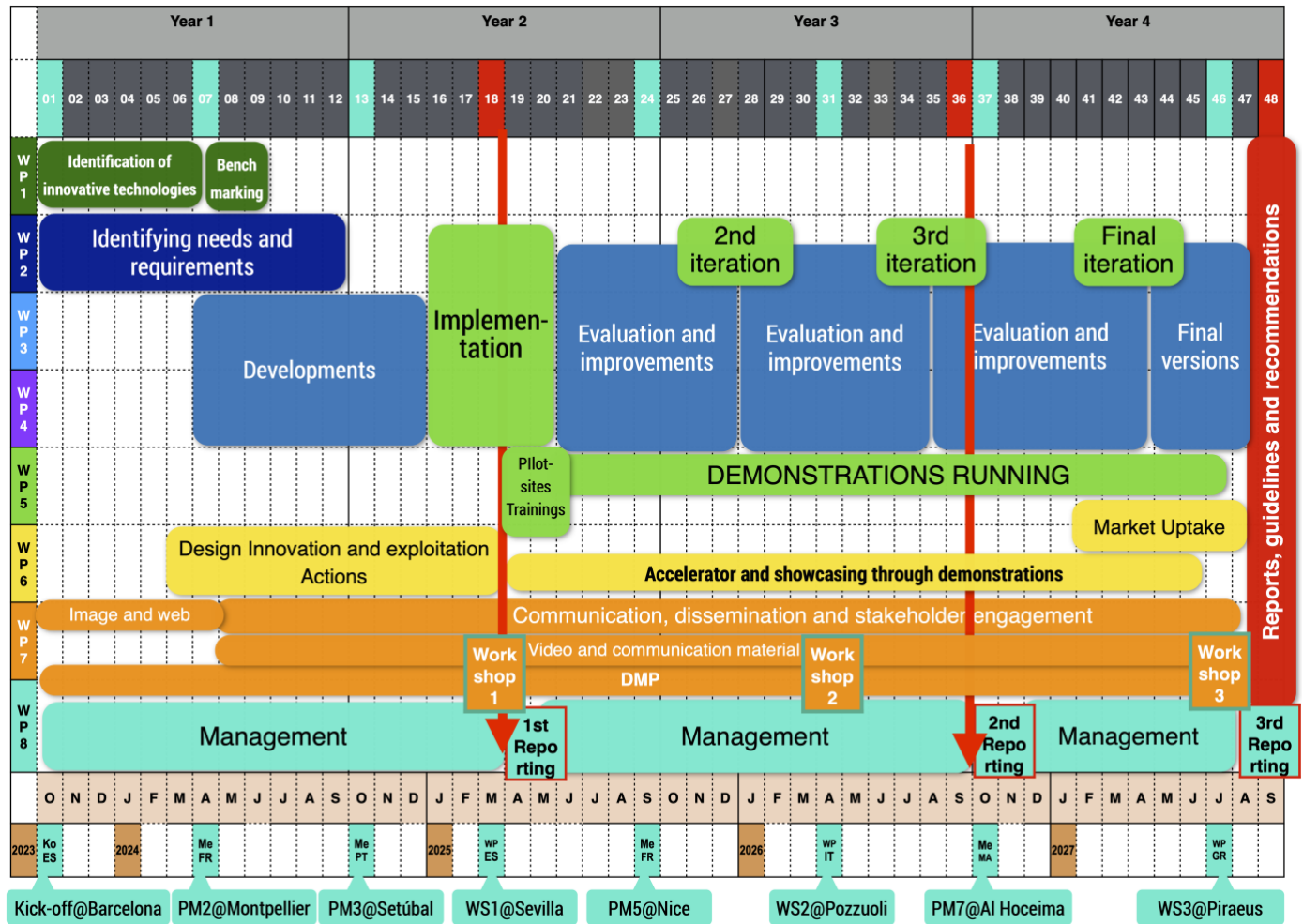
Figure 10: Graphical presentation of the Work Package structure

The project Work Plan is composed of 8 Work Packages (**WPs**) summarized in Table 7. Relations between **WPs** are graphically presented in **Figure 10**. The temporal distribution is shown in the Gantt Chart in 3.1.1, and the detailed description of the objectives, tasks, methodological approach and outcomes of each **WP** is presented in Description of the action (part A)

Table 7: List of work packages

WP #	Work package title	Lead Partner	PMs	Start	End
WP 1	Comparison and benchmarking of existing technologies to enhance the response capacity and proposition of innovations	UNINA	47	M01	M09
WP 2	Co-design of MR-IEWS and response systems in cooperation with authorities and first responders	BRGM	105	M01	M012
WP 3	Development of the European and the Union for the Mediterranean MR-IEWS platforms	ECMWF	100	M07	M47
WP 4	Local and Regional DSSs prototypes to support rapid deployment and response	HYDS	90	M07	M47
WP 5	Demonstrations of the platform and prototypes in regional operational environments	AMAYA	231,5	M16	M48
WP 6	Adoption Accelerator Program: boosting Innovation, exploitation and market uptake	PREDICT	29	M01	M48
WP 7	Maximizing impact: Dissemination, Communication, Data Management and Stakeholders engagement	DRAXIS /UPC	68	M01	M48
WP 8	Project Management	UPC	83	M01	M48
Total			753,5		

3.1.1. Timing of the different WPs and their components (Gantt Chart)



3.2. Project management and meetings in post-COVID times

All the project meetings will be web-streamed and partners will allow to participate remotely. However, in the proposal the meetings are conceived primarily as physical meetings since personal interaction is a key factor that facilitates promoting co-creation. We think this is a realistic approach for a project of **48 months starting end 2023**. However, the **Coordinator** will ensure a smooth change to telematic means if necessary.

3.3. Consortium as a whole

The **GOBEYOND** Consortium directly responds to the call of the work programme requiring a **strong cross-disciplinary cooperation between scientists, developers, first and second responders, regional and local planning, and management authorities**. It also includes the capacity to bring the project KERs to the **high TRLs required** as well as to propose a **credible innovation plan to prepare their market uptake**.

Table 8: Table of the expertise distribution among the partners of GOBEYOND

	UPC	ECMWF	UNINA	BRGM	HYDS	PREDICT	DRAXIS	AMAYA	NOA	ATT	HRT	POZZ	ECPA	EST	ADPN	VFDB	SET	SMI	ICES	MCH	AVSRE	CECAT	DGPOE	LEPE	ICRIS	PIR	DGRN
Disaster Risk Management (DRM)	**	***	**	*	*	***		**	**	***			***	***	**	**	***	***	**	**	***	***	***	**	**	*	**
Impact Forecasting	***	***	**	***	**	***		**	**	*			**	*	*	**	*	**	***	*	*	*	*	*	*	*	*
Early Warning Systems	***	***		**	***	***	**	**	**	*			*	*	***	*	**	**	*	**	*	***	***	*	*	*	***
First and second response								***		***		***	***	***	**	**	***			*	***	***	***	***	***	***	**
Emergency Management	*	**		*	*	***	**	***		***		***	***	***	**	***	***	***	*	*	***	***	***	***	***	***	**
Crisis communication	**		**	*		***		**		***		**	***	***	**	***	***	***	*	*	***	***	***	***	***	***	**
Site Specific Warnings	***	**	***	**	**	***		*		**			***	***	**		***	***	***			*	**	**	**	*	**
Climate Change Adaptation	***	*		***	*	***	***	*		***			*	*			***	*	**	*	**	***	***	*	*	*	*
Resilience	***		**	***	**	***		*	**	*			**	*	*	***	***	**	*	**	**	***	***	*	*	*	*
Climate extreme events	***	***		*	**	***	***	**		*			**	*			**	**		***		**	**	*	*	*	*
Meteorological Forecasting	**	***			**	***	**	***	*	**			**	*	*		*	*		***		**	**				*
Storm forecasting	**	***		*	*	***		*		**			**				**	*		***		*	*				
Flood EWS	***	***			***	***		*		*			**		***		**	***		*	*	*					***
Heat waves EWS	**	***			*			*		*			*			?	*	*		***		*	*				
Landslides EWS	***	**		***	*	**											*	*	*	*							
Storm surges	***			**	*	***				**							*				*	*					
Droughts	***	***			***	***				*							**			***							
Forest fires	**	***			**	**				***							***										
Earthquakes			***	***	*	*		*	***	***			**		*		*		***			**	**				*
Volcanic eruptions			***	**	*	*			***	*																	
Tsunamis			*	***		***		*	***	**			**		*		**							**	**	**	*
Risk awareness and education	**	**	**	**	*	**	**	***	*	**		***	***	***	*	***	***	***	**	**	***	***	***	***	***	***	*
Participatory Approaches	**			*		**	**	**		*		***	***	***	*	**	***	***	**	**	***	***	***	***	***	***	*
Decision Support Systems	***	**	**	**	***	***	***	*	**	*			***	*	***	***	*	***	**	*	**	***	***	*	*		***
IT development	**	***	***	**	***	***	***		**	*			**	*			*	*	**		*	*					
Regional and local planning needs	**			*		**		**	**	**		***	***	**	**	**	***	***	***	**	***	***	***	***	***	**	**
Ethical, legal, environmental implications									*				**	*			*	**		**	***	***	***	**	**	**	
Regulatory and Policy									**			**	***	**			***	**		***	***	***	***	**	***	**	
Open Sciences practices	***	***	**	***					***	*						**			*	***							
Gender inclusive practices	***	**	**	***	*	*		**	***	*		**	***	***	**	**	***	**	*	***	***	***	***	***	***	***	**
Project management	***	***	**	***	***	***		**	***	**			*	*	*	*	***	***	***	*	*	*	*	*	*	*	*
Innovation	***	***	***	**	***	***	***	**	***	***			*	*	*	**	**	**	***	***		*	*	*	*	*	*

Thus, **GOBEYOND** presents a consortium of **18 partners and 9 associated partners** from **6 EU countries + Morocco + Switzerland + an International institution (ECMWF)**, built with the model of the **Quadruple Helix**: Research, public sector, business, and society. They have been selected to ensure that the involved regional/local authorities and responders are well represented and supported by top **research institutes on geo and weather/climate services alongside international lead operational hydrometeorological forecasting services and IT developers**. The consortium has a number of key complementing competences covering all the fields of expertise required to achieve the objectives of the project (see Table 8).

- It combines academic research (**UPC, UNINA**) with practice-oriented research profiles (**ECMWF, BRGM, NOA**);
- It has the ability to provide already available operative forecasts for weather/climate hazards (**UPC, ECMWF, MHC**) and geohazards (**UNINA, BRGM, NOA, ICES**);
- It involves operational authorities and agencies (**ECMWF, MCH**) providing 24/7 geo and weather forecasts
- It includes SMEs (**HYDS, DRAXIS**) and enterprises (**PREDICT**) with a large portfolio of already operative IT developments for EWS and decision support platforms. Their developments support the transfer of competences and methodologies and can be replicated throughout Europe, the **UfM** countries and *beyond*;

- It includes **thirteen operational CPAs and first responders** at regional (**AMAYA, EPCA, ATT, CECAT, AVSRE**), municipal (**EST, SET, POZZ, SMIAGE, LEPE, ICRIS, PIR**), and national (**DGPCE**) levels across EU countries + Morocco (**APDN and DGRN**) to cover the wide-range of requirements and needs.
- It includes civil society organizations (**ICES, HRT, VFDB**) active in the field of impact-based forecasting and act as first responders during emergencies (e.g., providers pro bono alerts and loss estimates, members on missions in case of rescue and safety)
- Several partner organisations have led European Projects in the relevant topics (**UPC, UNINA, DRAXIS, BRGM, NOA**), or are prominent members of European network organizations (**ECMWF, MHC**). An overview of the most relevant European projects and programs executed by the consortium members is presented in **Table 2**.

Additionally, several Civil Protections and municipalities have already expressed their commitment and support as project Stakeholders and the willingness to participate in the **CoP (T7.5)** if the project is funded. In particular we have the written commitment from the **Italian Department of Civil Protection** ([see letter of commitment](#)). Also, **Rete Ferroviaria Italiana (RFI)**, the railway infrastructure manager in Italy, has sent a [letter of commitment](#) with the project. Thus, the **GOBEYOND** consortium is designed to really address the challenge to foster, not just [“a cohesive community of interdisciplinary disaster scientists”](#), but a complete representative Community in the field of the **response to weather, climate and geological extreme events**, following the initiative promoted by **DG HOME** to create a [Community of European Research and Innovation for Security](#).

3.3.1. The role of Associated Partners

As Switzerland is considered as a non-associated third country in Horizon Europe, the Swiss partners **MCH** and **ICES** are not eligible for funding and are participating as **Associated Partners** (not eligible to declare costs). However, **they will carry out substantial work in the project, contributing with their outstanding expertise to achieve the objectives of the project**. They will receive their funds directly from the [Swiss Government](#), if the project is funded.

Additionally, the consortium has 7 Associated Partners, that contribute with their expertise as **Civil Protections at national, regional and local level** to the success of the project. They will carry out significant work in the tasks of Co-design of the solutions (**WP2**) and in evaluating the results in the regional demonstrations of **Attica (T5.4)**, **PIR** municipality, **Al Hoceima (T5.6)**, **DGRN**, and **Andalusia (T5.3)**. **DGPCE is the national Civil Protection of Spain**, and will ensure the coordination of the Andalusia demonstration with the national and international levels ([UCPM](#)). **CECAT** and **AVSRE** are the **regional Civil Protections** of Catalonia and Valencia (ES). **ICRIS** and **LEPE** are two municipalities in the Spanish Atlantic coast, covering an area exposed to Storm surges and Tsunamis, and they will participate actively in the **Andalusia demonstration LL**. **CECAT** and **DGPCE** were demonstration pilots in project [ANYWHERE](#).

All 7 **are strongly committed with the objectives of the project**. However, due to internal constraints, they prefer to participate as **Associated Partners** and avoid administrative duties. They will participate with their own resources (equivalent to 4 PMs). The project will cover the travel expenses of their personnel when participating in the project activities (OTHER DIRECT COSTS budget item to pay travel costs to CoP Stakeholders and Associated Partners).

Table 9: Budget table for the Associated Partners

	A. Personnel costs	C.1 Travel and Subsistence	E. Indirect costs	Total Cost	EU contribution to eligible	National Funding	Own resources
19 - ICES	400.000,00	16.800,00	104.200,00	521.000,00	0,00	521.000,00	0,00
20 - MCH	400.000,00	22.190,00	105.547,50	527.737,50	0,00	527.737,50	0,00
21 - CECAT	16.000,00	0,00	4.000,00	20.000,00	0,00	0,00	20.000,00
22 - AVSRE	16.000,00	0,00	4.000,00	20.000,00	0,00	0,00	20.000,00
23 - DGPCE	16.000,00	0,00	4.000,00	20.000,00	0,00	0,00	20.000,00
24 - LEPE	14.400,00	0,00	3.600,00	18.000,00	0,00	0,00	18.000,00
25 - ICRIS	14.400,00	0,00	3.600,00	18.000,00	0,00	0,00	18.000,00
26 - PIR	12.000,00	0,00	3.000,00	15.000,00	0,00	0,00	15.000,00
27- DGRN	12.000,00	0,00	3.000,00	15.000,00	0,00	0,00	15.000,00
TOTAL	900.800,00	38.990,00	234.947,50	1.174.737,50	0,00	1.048.737,50	126.000,00

3.3.2. Advisory Board (AB)

The **AB** will be composed of 4 -recognized international experts on the subjects covered by **GOBEYOND**. It will supervise and guide with expert recommendations the advancements of the work in the project. Additionally, it will be an instrument to increase the international connections and visibility of **GOBEYOND**. The **AB** will provide 3 review reports (Milestones **M8.1**, and **M8.3**, and Deliverable **D8.3**). Their dedication to **GOBEYOND** has been estimated in one week per year, plus the attendance to 3 workshops or meetings. Specific funding to cover the attendance of the **AB** to the workshops/meetings, and some honorariums, will be managed by the Coordinator as Other Direct Costs.

Expert	Main field expertise	Affiliation
Dra Olimpia Imperiali	Crisis management	DG-ECHO ⁴
Laurent ALFONSO	Emergency management	UfM ⁴
Dr. Matthias Steiner	Risk Assessment and Management	NCAR
Dr. Peter Salamon	Risk Assessment and Management	JRC ⁴

3.4. Resources to be committed

3.4.1. Subcontracting:

Includes the cost associated to subcontract a professional to record and produce the project Videos (50k€) in **T7.3**. The Innovation Prize (50 k€, **T6.3**) is for the moment under this item. This budget has been assigned to the coordinator.

Article 6.2.B and 9.3 of the GA and are applicable and respected during the selection of the subcontractor (i.a. best value for money, no conflict of interest”).

3.4.2. Purchase costs items

Some of the partners show **purchase costs exceeding the 15% of the personnel costs**. The details of partners exceeding the limit are in the following tables.

1- UPC	Cost (k€)	Justification
Travels and subsistence (T & S)	50,65 k€	Participation in 4 project meetings, 2 Trainings and 3 Workshops, plus specific trips related to the Coordination including review meetings in Brussels and specific meetings with the Project Officer. Also travels to scientific/technical conferences to disseminate the results, meetings of the CERIS (DG-HOME) and SRE conferences (DG-HOME) representing the project.
Other goods and services (G & S)	271 k€	WP7: Travel and subsistence costs of 50 members of the CoP to participate at least in 2 workshops and/or trainings: 200.000 € (≈50x2x2000€). WP7: Travel and subsistence costs of 5 EU Associated Partners to participate at least in 2 workshops and/or trainings: 20.000 € (≈5x2x2000€). WP7: Logistic costs (including external services as room rentals, catering, audio-visual support, invited speakers' expenses, web-streaming transmission and other minor supplies) to organize the Kick Off Meeting in M01 and external services for a Team Building Activity: 10.000 € . WP8: Costs associated to the participation of the Advisory Board members in 3 meetings (travels and expenses), including honorariums for 1 week per year to review documentation and write the evaluation reports: 35.000 € . External Audit Costs: 6.000 € .
Total	321,65 k€	
2-ECMWF	Cost (k€)	Justification
T & S	25 k€	Participation in 4 project meetings and 3 Workshops, plus specific trips related to the review meetings in Brussels. Also travels to scientific/technical conferences to disseminate the results.
Other G & S	30 k€	WP7: Costs associated to the development of the DMP : 15.000 € . WP7: Publication costs: 5.000 € . WP8: External Audit Costs: 10.000 € .
Total	55 k€	
8-AMAYA	Cost (k€)	Justification
T & S	15,97 k€	Participation in 4 project meetings, 1 Training and 2 Workshops, plus specific trips related to the pilot sites and review meetings in Brussels.
Other G & S	30 k€	WP7: Logistic costs of the Workshop 1 in Sevilla in M18 : 20.000 € . WP7: Logistic costs of the Hands-on Training in Sevilla in M36 : 10.000 € .

⁴ Non-exclusive acceptance, conditional on the proposal being funded.

Total	45,97 k€	
9-NOA	Cost (k€)	Justification
T & S	12,51 k€	Participation in 4 project meetings and 2 Workshops and the last review meetings in Brussels.
Total	12,51 k€	
10-ATT	Cost (k€)	Justification
T & S	11,59 k€	Participation in 4 project meetings 2 Workshops.
Other G & S	30 k€	WP7: Logistic costs of the Workshop 3 in Athens in M46: 20.000 €. WP7: Logistic costs of the Hands-on Training in Athens in M46: 10.000 €.
Total	41,59 k€	
12- POZZ	Cost (k€)	Justification
T & S	12,67 k€	Participation in 4 project meetings and 2 Workshops.
Total	12,67k€	
13- ECPA	Cost (k€)	Justification
T & S	13,21 k€	Participation in 4 project meetings and 2 Workshops.
Total	13,21 k€	
14- EST	Cost (k€)	Justification
T & S	7,1 k€	Participation in 4 project meetings and 3 Workshops. (1 people)
Total	7,1 k€	
15-SET	Cost (k€)	Justification
T & S	7,595 k€	Participation in 3 project meetings and 3 Workshops (1 people).
Other G & S	10 k€	WP7: Logistic costs of organizing the Project Meeting 2 in M13: 10.000 €.
Total	17,595k€	
16-SMI	Cost (k€)	Justification
T & S	6,605 k€	Participation in 3 project meetings and 3 Workshops (1 people).
Other G & S	10 k€	WP7: Logistic costs of organizing the Project Meeting 3 in M24: 10.000 €.
Total	16,605 k€	
17-APDN	Cost (k€)	Justification
T & S	13,39 k€	Participation in 3 project meetings and 3 Workshops.
Other G & S	10 k€	WP7: Logistic costs of organizing the Project Meeting 4 in M37: 10.000 €.
Total	23,39 k€	

The tables 'Other cost categories' items (eg. internally invoiced goods and services) and 'in-kind contributions' provided by third parties are no applicable.

4. Ethics self-assessment

4.1. Ethical dimension of the objectives, methodology and likely impact

The Province of Al Hoceima in collaboration with the Agence pour la Promotion et le Développement économique et social des préfectures et provinces du Nord du Royaume (**APDN**) and the Directorate of Natural Risk Management under the Ministry of the interior of the Kingdom of Morocco (**DGRN**), will integrate the fifth demonstration site in the GOBEYOND project. PREDICT will act as developer and will use their already implemented platform VIGIRISQUES to integrate the impact forecasting capacities integrated in the GOBEYOND MR-IEWS Processing Core (T3.1). This will allow Morocco to have access to an EWS with unprecedented capacities in the country, as

well as serve as a showcase of what can be done in the countries of the UfM, and in general to support the UN EW4All initiative in Africa. Moreover, this demonstration can help start an international vision of an EWS for the whole Mediterranean basin: the EW4MED, that which allow GOBEYOND to contribute to support the Target G goal of the SFDRR and to the WMO action plan EW4ALL, declared as an international priority by the UN at COP27.

To carry out this work, no local participants and local resources will be exploited to the benefit of the GOBEYOND project. Moreover, no material (animal, human fauna and flora) will be imported from or exported to Morocco. Most importantly, individuals, participants and partners will not be exposed or at high-risk during the scheduled activities and appropriate safety measures and guidelines will be undertaken to guarantee it throughout the duration of the demonstration. Finally, no adverse impacts derived by the activities within the demonstration in terms of environmental damage or stigmatization of social groups are foreseen.

4.2. Compliance with ethical principles and relevant legislations

The Morocco demonstration is foreseen to support the development and testing of a local Multi-Risk IEWS prototype adapted to support Civil Protection Authorities (CPAs) and first/second responders in their situational awareness and rapid deployment during weather, climate, but also geophysical emergencies in Al Hoceima and all relevant governmental institutions.

In this context, the demonstration and all activities planned will comply with the highest ethical standards, especially the European Code of Conduct for Research Integrity and the European Convention of Human Rights. In GOBEYOND, we will ensure all activities carried out together with the relevant governmental institutions comply with the legal obligation of the EU and Morocco. In that context, all the activities in the demonstrations including the Al Hoceima province, will be permitted based on the current legislations, on all EU Member states, no exceptions.