



# Report on Civil Protection Plan Data to be digitized

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Specific objective	2.1
Specific objective Title	Promoting climate change adaptation and disaster risk prevention, resilience, taking into account eco-system based approaches.
Work Package Number	1
Work Package Title	Digitalization model of civil protection plans and IoT EDSS Platform Development
Activity Number	1.1.
Activity Title	Collection of Civil Protection Plans local data
Partner in Charge	GAL Molise
Partners involved	All partners
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## About Digital Plan Project

The main objective of the project is the digitalization of civil protection plans, already operative in the territorial areas of competence of the PPs, to improve the capacity of local authorities to investigate the risks present, to define common operational methods of action in the event of a disaster and in particular to share all the emergency planning with other bodies and agencies in charge of rescue, for compress intervention times, and with the population.

## Project relevance

The selected theme of digitalization of CP Plans represents a common interest for Italian and Croatian territories that present similar problems and demand common transnational solutions. Fragmentation of the area and different status of civil protection systems create heterogeneity in hazard handling. Yet, risks and disasters, sure enough, do not recognize state borders and other boundaries imposed by human conventions and treaties. Common risks affect the whole area and the need for a homogeneous, interoperable, and EU-integrated approach is a necessity. This means both homogenizing plans and procedures in the area and presenting common tools for civil protection plan digitalization.



Further to homogenization, such a plan, its accompanying capacity building and training, and its adoption by partners will strengthen the administrative and technical capacities of local authorities in managing hazardous and emergencies. Moreover, partners will benefit from the transnational process of exchange of know-how and from a common basis of knowledge and experience, which will help individuate solutions for enhancing resilience in uniformly dealing with natural and man-made hazards within the involved territories. By empowering territorial resilience, the project reduces overall Italian and Croatian programme area vulnerability through extensive information interchange in both vertical and horizontal directions.

The Digital Plan project will contribute to disaster risk reduction, and management efficiency both in the planning phase and in emergencies, collaborating in the building of resilience in the Adriatic region, through the strengthening of cross-border territorial cooperation with the help of innovative technologies both through DSS (Decision Support System) and through the integration of IoT (Internet of Things) sensors.

A poor sharing of emergency planning and management tools and the effects of forecast and ongoing climate change such as extreme weather events, floods, droughts, increased temperatures, and major snow events are a "powder keg" in the world of risk management and the emergency.

The cooperation between the territories of Italy and Croatia, with this project, supports the strengthening of resilience in all sectors of activity in the field of civil protection;



The territories of the PPs, given their proximity, also share the impacts of multiple extreme phenomena - meteorological or seismic - for which it is essential to share knowledge, skills, and equipment in the event of disaster response, but also during the other phases of the resilience-building and contingency planning cycle.

Until now, the world of extreme events and climate change has been seen as two separate entities, but this is not correct, the main challenge derives from the assumption that good emergency response planning also makes it possible to identify and apply tools and climate adaptation actions.

This cross-border initiative is particularly needed while the entire Adriatic region is preparing to manage events related to climate change and the management of any emergency crises. Climate change mitigation and adaptation can only be achieved through an integrated approach of territorial cooperation and resilience building by endorsing the entire resilience cycle: planning and preparedness, prevention, response, mitigation, recovery, and adaptation towards a new equilibrium. The Deming cycle, the reference point of emergency planning (planning, execution, control, and adjustment), can be perfectly integrated into this cycle.

Finally, in the Sendai Framework for Disaster Risk Reduction (2015-2030), the project's actions support the ultimate goal of achieving results.



The 2015 Sendai Document and the United Nations International Strategy for Disaster Reduction emphasized the need to address disaster risk reduction and climate change adaptation in setting sustainable development goals.

The project with its actions goes precisely in this direction and specifically aims to improve the understanding of disaster risk, improve disaster preparedness for effective response and rebuild better in the recovery phase by setting some overall objectives in the project actions such as increasing entities with their disaster risk reduction strategies and increasing the availability of and access to multi-hazard early warning systems and disaster risk information and assessments.

## **WP1: Digitalization model of civil protection plans and IoT EDSS Platform Development**

WP1 aims to develop a cross border model for civil protection plan digitalization. It will be based on a set of activities, starting from collection of data from civil protection plans, selecting the risks affecting the plans, the emergency flow charts, open data sources like public and private platforms, websites and webcams, to carry out a preliminary analysis of the needs of each individual PPs and to study the local civil protection plans. Furthermore, WP1 also focuses on the development of a scalable and capitalizable IT platform that can achieve several goals: (i) digitization of civil protection plans; (ii) access to geolocated open



data sources and IoT sensors; (iii) manage synthetic georeferenced environmental data. Given the ongoing impact of climate change and its potential to increase the frequency and severity of extreme weather events, a key component of the platform will involve conducting multivariate statistical analyses.

## Activity 1.1.: Collection of Civil Protection Plans

### local data

#### Period 1, month 1-6, 01/03/2024-31/08/2024

LP1 in collaboration with PP4 and PP7 will develop a common template to collect the data of Civil Protection Plans of all partners involved, including the identification of risks affecting the areas to be uploaded in the platform developed under WP2. The partners will select the main risks to be integrated into the EDSS platform based on the identified risks inside the civil protection plan, at least one for each partner and not more than three. The data collected will also include the communication, decisional and organizational flow established in case of emergency by the PPs. LP1, PP2, PP3, PP5, PP6, and PP8 will complete the provided template and identify at least one civil protection plan to be digitized and included in the EDSS platform.



# Deliverable 1.1.1 Report on Civil Protection Plan

## Data to be digitized

LP1, in collaboration with PP4 and PP7 have developed a questionnaire sent to all PPs on 25 October 2024, to make a check-up on civil protection activities in each territory of the partnership and, in summary, to develop a common model for the collection of information and data relating to the Civil Protection Plans of each PP (LP1, PP2, PP3, PP5, PP6 and PP8).

Each PP involved has identified the most significant risks affecting its territory of direct or indirect competence, if the PP involved does not have a reference territory but participates in the project with territories affiliated to it (e.g. LP1).

The areas identified will be subsequently included in the activities of WP2.

In the framework of Activity 1.1 “Collection of Civil Protection Plans local data” of WP1, GAL MOLISE (LP, in accordance with PP4 and PP7) is carrying out a “Digitalization model of civil protection plans and IoT EDSS Platform Development” policies in DIGIT PLAN’s pilot areas.

The questionnaire is structured into five sections:

1. Overall assessment
2. Legal framework



3. Data management e storage

4. Pilot areas

5. Risk framework

Below is the result of the analyses conducted with all the PPs involved in this activity, setting out where possible a summary of the results and, where detailable, the precise focus for each PP.

## Section 1 - Overall assessment

### PPs involvement in emergency and hazard planning (summary of 8 request)

- LP1: GAL Molise is not involved. The responsibility is up to National and Regional government through Civil Protection departments, and Municipalities through local civil protection offices.
- PP2: AGRRA is not involved. Zadar Public Fire Brigade (JVP Zadar). The Civil Protection Headquarters of Zadar County operates at the county level, while each local self-government unit has its own city or municipal headquarters. The members of a local self-government unit's civil protection headquarters include, by function: the head of the local police station, a representative of the regional office of the state



administration body responsible for civil protection, the fire brigade commander, a representative of the Red Cross, and the head of a healthcare institution

- PP3: The entity that manages Civil Defence Emergency Planning is Regional Civil Protection Agency. Entity's area of responsibility is Regional. Relationship between institution and Regional Civil Protection Agency: agreement with resolution on the Fire Department and agreement with the municipalities regarding the risk of avalanches.
- PP5: The Municipality of Dubrovnik is involved in emergency and hazard planning through its Civil Protection Department. The territory of competence of the Dubrovnik Civil Protection Department is primarily local, focusing on the city of Dubrovnik and its surrounding areas
- PP6: Under the supervision of the Split Dalmatia County operates the County Civil Protection Headquarters which manages civil defence emergency planning and response at the regional level which aligns with Croatia's regional level of administration. The County Headquarters collaborates with municipal and city civil protection headquarters, as well as with the Regional Department - Directorate of Civil Protection under the Ministry of the Interior for national-level coordination.
- PP8: The Civil Protection Service of the Municipality of Fermo is directly involved in the planning and drafting of emergency plans, analysis of the municipal territory and the risks present. The field of competence is municipal. The Civil Protection Service of the Municipality of Fermo collaborates and cooperates with all the structures set up for urgent technical aid, medical aid, institutions that deal with civil defence



## Section 2 – Legal Framework

### Legal framework: clear division of roles and responsibilities at different levels of government (summary of 7 request)

This cooperation project, involving 2 EU states, obviously highlights significant differences in the legal framework of reference and therefore in force at the time of filling in the questionnaire, so to summarize, the answers have been grouped and then summarized by PP belonging to the different states.

- LP1, PP3 and PP8: The civil protection authorities are part of the National Service and, according to the principle of subsidiarity, differentiation and adequacy, guarantee the unity of the legal system by exercising, in relation to their respective areas of government, the functions of political direction in matters of civil protection and which are:
  - President of the Council of Ministers;
  - Presidents of the Regions;
  - Mayors and Metropolitan Mayors.

(according to Legislative Decree no. 1 of 2.1.2018 - Civil Protection Code; directive of the President of the Council of Ministers, 2021 and Directive of the President of the Council of Ministers of 28 January 2024)



- PP2, PP5, PP6: Croatia has a Civil Protection System Act (Zakon o sustavu civilne zaštite) that serves as the primary legal framework for emergency planning and civil protection. Local authorities handle preparedness and initial response, while regional governments coordinate broader efforts. The national government, through the Directorate of Civil Protection, oversees policy, resource allocation, and large-scale disaster management. Coordination among levels ensures an integrated, effective response to emergencies.

## Section 3 – Pilot areas

In this section, the pilot territories chosen by the PPs for the application of the project are presented.

LP1: Municipality of Busso and Municipality of Montagano (characteristics of the area: hilly and rural area)

PP2: City of Zadar, Municipalities of Zemunik i Škabrnja and Municipality of Posedarje (characteristics of the area: coastal, urban and rural)

PP3: Caramanico Terme, Lama dei Peligni and Pratola Peligna (characteristics of the area: hilly, rural and mountain area)



PP5: City of Dubrovnik (characteristics of the area: coastal area and hilly area)

PP6: Žrnovnica, City of Split. (characteristics of the area: urban, rural and mountain area)

PP8: Municipality of Fermo (characteristics of the area: costal, urban and rural)

## Section 4 – Risk framework

This section shows the tables relating to the analysis of the risks present in the pilot areas and in particular the risks of direct competence of the civil protection system and the secondary ones, where the civil protection system interacts and supports those responsible for emergency management.

### **Risk Framework: Main risks for civil defense competence into the pilot area**

	LP1	PP2	PP3	PP5	PP6	PP8
<b>main risks of civil defense competence present in the pilot area (max. 3)</b>						
Hydraulic risk						X
Hydrogeological risk	X	X	X			X
Risk of adverse weather phenomena			X			X
Climatic risk	X				X	
Seismic risk		X		X		
Volcanic risk						
Tsunami risk						
Forest fire risk	X	X	X	X	X	
Risk of water deficit						
Others (please specify)			X (Avalanches)			



From the analysis of the heaviest risks, it is clear that in 5 of the 6 PPs involved in the analysis there is a forest fire risk, the hydrogeological risk drops to 4 out of 6, the PP3, characterized by a high-mountain area, shows an extensive avalanche risk.

**Risk Framework: Secondary risk in the pilot area**

	LP1	PP2	PP3	PP5	PP6	PP8
<b>secondary risks of civil protection interest present in the pilot area (max. 3)</b>						
Chemical risk						
Nuclear risk						
Radiological risk						
Technological risk						
Industrial risk			X			X
Transport risk		X				X
Environmental risk s.l.		X		X	X	X
Hygienic-sanitary risk						
Risk of uncontrolled re-entry of space objects and debris						
Other (please specify)						
NO secondary risk	X					

The results of the PP responses show a frequent response on the environmental risk sl, which will necessarily have to be investigated for each or of the PPs, as the type of risk is not clear.



**Risk framework: CP risk to focus on, selected by PPs involved.**

	LP1	PP2	PP3	PP5	PP6	PP8
<b>civil protection risks you would like to focus on (max. 2)</b>						
Hydraulic risk						X
Hydrogeological risk	X	X				X
Risk of adverse weather phenomena						X
Climatic risk	X					
Seismic risk		X				
Volcanic risk						
Tsunami risk						
Forest fire risk	X		X	X	X	
Risk of water deficit						
Other (please specify)			X (SNOW RISK)			

The analysis of the responses shows that all the PPs generally confirmed their interest in the risks present in the area, but some considered to focus attention only on some aspects, evidently considered more critical.

**From the critical analysis of the results and having to select a maximum of 3 risks on which to focus the analysis, forest fire risk and hydrogeological risk si are starkly more impactful. The avalanche risk that characterizes PP3, as it is a risk that is still little known and studied, given that current scientific products consider almost exclusively the danger, offering a starting point for technical in-depth study.**

## Type of sensors selected

The evaluations of the PPs on the sensors of greatest interest are reported below.



- LP1: Rain gauge: measures the amount of rainfall; Thermometer: measures the temperature of the area; Soil moisture: measures the humidity of the soil, useful for both forest fire risk management, water deficit, flood and landslide risk
- PP2: Interferometric Synthetic Aperture Radar (InSAR) is a highly effective remote sensing technique for disaster risk prevention, renowned for its ability to detect and measure ground deformation; GNSS Continuously Operating Reference Stations Vital tools for disaster risk prevention, offering precise, real-time monitoring of ground movements; Robotic Total Stations with Prism Reflectors for Landslide Monitoring - Robotic Total Stations (RTS) equipped with prism reflectors are highly effective tools for monitoring landslides
- PP3: Sensors that measure the following parameters: Temperature, humidity, snow depth, volatile organic compounds.
- PP5: Sensors with thermal imaging cameras. Detect heat anomalies in forested areas, enabling early fire detection before flames become visible. Effective for identifying fires in rugged terrains where visibility may be limited.
- PP6: Temperature and Humidity Sensors; 2. Smoke and Gas Sensors; 3. Optical Sensors and Infrared (IR) Cameras
- PP8: Weather and hydrometric stations with camera integration and Underpass flooding sensors with camera integration

**From the critical analysis of the results and having to select a maximum of 3 types of sensors to be tested on the pilot areas selected by the respective PPs, common sensors**



are proposed with reference to the selected risks, without denying the possibility for individual PPs to evaluate additional and different sensors than those proposed.

- **Forest fire risk:** Rain gauge, thermometer, anemometer, relative humidity and soil moisture
- **Hydrogeological risk sl:** Rain gauge, thermometer, hydrometer where necessary
- **Avalanche risk:** Rain gauge, thermometer, snow depth, anemometer

## Section 5: Data management and storage

*GIS system, Cloud space for the management of spatial data, territorial data management system have data exposed through API, WMS, and WFS services and emergency plan displayed*

From the analysis of the responses of the PPs on this specific issue related to the presence of GIS tools or software infrastructures to support decisions, it is evident that the tools available are extremely heterogeneous and above all the availability of data is not in standard and open data formats.

This evidence could represent an application limit for the project, but also an opportunity in the analysis of shared and cooperative solutions for data interchange and representation. Below are reported PPs answers:



LP1: No GIS, API-WMS-WFS, cloud space and emergency plan displayed.

PP2: No GIS and cloud space. Management system through API, WMS, WFS: There is an online map Risks (Disaster Risk Assessment 2024) for the entire country, divided by counties, where risks are listed and categorized by severity – low, moderate, high, and very high. The risks include harmful plant and animal organisms in agriculture, extreme temperatures, epidemics and pandemics, landslides, nuclear accidents, marine pollution, floods caused by overflow of inland water bodies, earthquakes, open-type fires, radiological accidents, snow and ice, drought, and soil salinization. Data on risk intensity at the lower, municipal level is not available. (Civil emergency plan displayed: <https://www.zadarska-zupanija.hr/civilna-za%C5%A1titaforZadarCounty>, <https://zeoscz.mup.hr/portal/apps/dashboards/3dc1f9d8394d4e82a3d3ccba9ce7cfc2> for Republic of Croatia).

PP3: No GIS and Cloud space. Management system through API, WMS, WFS: The spatial data of the municipalities of the Maiella NEW pilot area are not managed by API, WMS and WFS systems. On the other hand, the territorial data (vector or raster) that contribute to making up the Geographic Information System of the Abruzzo Region are freely accessible through the WMS protocol. Using this mode, the user can access over 180 services that can be consulted with open source or commercial GIS programs. The topics for which data are available are grouped into "Agriculture – Land use", "Aerial photo archive", "Raster background cartography", "Vector background cartography", "Soil protection, Geology and



Pedology", "Planning and constraints" and "Civil protection". (Civil emergency plan displayed: <https://mappe.protezionecivile.gov.it/it/mappe-rischi/piattaforma-radar/>);

PP5: No GIS, but There are GIS tools available but Civil protection emergency plan is not integrated in GIS. The City of Dubrovnik utilizes cloud-based systems for managing spatial data, enhancing accessibility and efficiency in urban planning and public services. Data storage system include: Web-Based GIS Platforms, Comprehensive Data Integration, User-Friendly Interfaces, Real-Time Updates and Enhanced Collaboration. - City of Dubrovnik utilizes WMS/WMTS. (Civil emergency plan displayed: chrome-extension: <https://www.dubrovnik.hr/uploads/pages/220/Plan-djelovanja-civilne-zastite.pdf>)

PP6: There is an online map Risks Disaster Risk Assessment 2024 for the entire country, divided by counties, where risks are listed and categorized by severity – low, moderate, high, and very high. The risks include harmful plant and animal organisms in agriculture, extreme temperatures, epidemics and pandemics, landslides, nuclear accidents, marine pollution, floods caused by overflow of inland water bodies, earthquakes, open-type fires, radiological accidents, snow and ice, drought, and soil salinization. Data on risk intensity at the lower, municipal level is not available. NO CLOUD and NO Management System. Civil emergency plan displayed for Split: Risk Assessment for Major Disasters for the City of Split, Civil Protection Action Plan for the City of Split; 2. For the city of Rupotine: Risk Assessment for Major Disasters for the Klis Municipality, Civil Protection Action Plan for Klis Municipality

PP8: The graphics as integral and substantial parts of the PEC Municipal Emergency Plan were entirely processed with GIS. The municipality of Fermo is equipped with an internal



web GIS for the exclusive use of technical staff. The Municipality of Fermo has a cloud space for the exclusively internal management and visualization of territorial data called "Silver Browser". In this management portal all the territorial data collected are merged "validated", therefore official such as, PRG, PAI, coastal area, perimeters, roads, emergency areas, etc... (Civil emergency plan displayed: <https://www.protezionecivilefermo.it/piani-di-emergenza/>

The critical analysis, confirming the heterogeneity on the management of spatial data and available products, highlights the need to thoroughly analyze the responses provided by the PPs and to design a technological solution that is able to satisfy the different realities in the management of territorial application data and fill the gaps highlighted by some PPs.

Furthermore, since there is no evidence of an already tested system of representation of digital civil protection plans, it will be useful for the whole partnership to take as a technical reference, the document produced by the National Civil Protection Departments on the management of digital civil protection plans (Decree of the Head of Department no. 265 of 29 January 2024 - Operational indications relating to the information organization of the necessary territorial data the implementation of an integrated IT platform at national level called the "National Catalogue of Civil Protection Plans"). Link: <https://www.protezionecivile.gov.it/it/normativa/decreto-del-capo-dipartimento-n-265-del-29-gennaio-2024/>



## Summary of results for follow-up activities

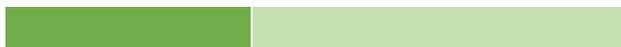
### Pilot Areas

PP	Number Areas	Name Area	Characteristics of the area
LP1	2	Municipality of Busso	hilly and rural area
		Municipality of Montagano	hilly and rural area
PP2	3	City of Zadar	costal, urban and rural
		Municipalities of Zemunik i Škabrnja	costal, urban and rural
		Municipality of Posedarje	costal, urban and rural
PP3	3	Municipality of Caramanico Terme	hilly, rural and mountain area
		Municipality of Lama dei Peligni	hilly, rural and mountain area
		Municipality of Pratola Peligna	hilly, rural and mountain area
PP5	1	City of Dubrovnik	coastal area and hilly area
PP6	1	Žrnovnica, City of Split	urban, rural and mountain area
PP8	1	Municipality of Fermo	costal, urban and rural

### Common Pilot risks

Code Risk	Name Risk
ForFir	Forest fire risk
Hydro	Hydrogeological risk sl
Aval	Avalanche risk





## Common Pilot Sensors

Code Risk	Pilot Sensors
ForFir	Rain gauge, thermometer, anemometer, relative humidity and soil moisture
Hydro	Rain gauge, thermometer, hydrometer where necessary
Aval	Rain gauge, thermometer, anemometer, snow depth

