

DESTRIERO

A DEcision Support Tool for Reconstruction and recovery and for the IntEroperability of international Relief units in case Of complex crises situations, including CBRN contamination risks

D5.2 – Adapter Design

Grant Agreement no.: **312721**

Call identifier: **FP7-SEC-2012.4.3-1**

Start date of project: 01/09/2013

Duration: 36 months

Deliverable:	D5.2
Title:	Adapter Design
Due Delivery Date:	28/03/2015
Actual Delivery Date:	05/05/2015
Lead Contractor for this deliverable:	SELEX-ES
Contributor:	CINI, TRT, UPVLC, EGEOS
Dissemination Level:	PP
Version:	01.00
Document Description:	This document presents how different kinds of adapters, each for a specific type of legacy tool to be interconnected by the DESTRIERO platform, are designed.



Revision History

Version Number	Description	Date Modified	Author
0.1	First release	15/01/2015	V.Esposito
0.2	Adapter Conceptual Contribution	22/01/2015	V.Esposito
0.3	EGEOS and TRT contributions integration	03/02/2015	M. Fiorentino
0.4	Information Sources details assignment to all deliverable partners	03/02/2015	M. Fiorentino
0.5	Contribution Integration (EGEOS and TRT) for paragraph §2.1, CINI contribution for paragraph §2.2	06/02/2015	M.Fiorentino, C. Garbellano, B. Goujon
0.6	EGEOS, TRT and UPV contribution for paragraph §2.2	06/02/2015	M.Fiorentino, C. Garbellano, B. Goujon, F. Perez Carrasco
0.7	Integrated SAADIAN overview on B2M and ne.on overview by Thales Programas, Added a detailed analysis on "Other Data Sources" for paragraph §2.2	09/02/2015	M. Fiorentino, E. Crean, A. Escalera
0.8	Integrated SELEX-ES Contribution on §2.2	11/02/2015	V. Esposito
0.9	Integrated CINI and SELEX-ES Scenario Contributions in §3.1	05/03/2015	M. Fiorentino, M. Cinque, V. Esposito
0.10	Updated SELEX-ES Contributions in §3.2	06/03/2015	V. Esposito
0.11	Integrated CINI scenario updates. Updates to SELEX-ES Contributions in §3.2. Information Sources have been updated.	10/03/2015	M. Fiorentino, V. Esposito
0.12	Integrated SAADIAN and THP contributions. Updates to scenario provided by CINI and SELEX-ES. Conclusions and tables descriptions updated.	27/03/2015	V. Esposito, E. Crean, A. Escalera, M. Fiorentino
0.13	Integrated TRT and UPVLC contributions. Updates to scenario provided by CINI and SELEX-ES.	1/03/2015	V. Esposito, M. Fiorentino, B. Goujon, F. Perez Carrasco
0.14	Updates to scenario provided by CINI and SELEX-ES.	7/03/2015	V. Esposito, M. Fiorentino
0.15	Updates to document format to be template compliant. Integrated UPVLC contributions.	9/04/2015	V. Esposito, F. Perez Carrasco
0.16	Integrated TRT and UPVLC contributions.	10/04/2015	V. Esposito, B. Goujon, F. Perez Carrasco



Version Number	Description	Date Modified	Author
0.17	Updated content based on THP review requests. Included EGEOS and SELEX-ES final contributions on Adapters. Included all partners' contributions on review activity.	27/04/2015	V. Esposito, E. Crean, M.Fiorentino, C. Garbellano, B. Goujon, M. Parente, F. Perez Carrasco
0.18	CINI updates to the demonstration scenario	28/04/2015	M.Fiorentino
0.19	THALES Programas review	28/04/2014	A. Escalera
01.00	Minor review updates	29/04/2015	V. Esposito,



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EXECUTIVE SUMMARY

This document summarizes the work carried out in task 5.2 (Adapter Design) about a DESTRIERO high-level Adapter architecture and sources specific Adapters design. The document is the second result of the activities of Work Package 5 (WP5 - DESTRIERO Architecture Design).

This document has to specify how adapters in the DESTRIERO platform are designed in order to allow legacy information sources and tools to be able to use the platform in a transparent manner without requiring any changes to their internal structures or procedures. Specifically, all identified D3.1 and D4.1 data and information sources have been analysed and, evaluating possible interactions within Users and available 3rd Party Systems, selected. Each selected tool has been detailed and a mapping of functionalities and an adapter design have been provided.

So, three main objectives have been identified:

- Evaluation of information Sources and exposed/required Services: an analysis of D4.3 activities has to be performed in order to identify all sources exposed services and possible sources/tools required information.
- Selection of sources to be integrated: based on Demonstration Scenario interactions requirements and available partners' tools, a subset of all identified D4.1 sources and tools have to be identified.
- Definition of Adapters Architecture: introduction to adapter concept with definition of architecture stack, providing specific sources adaptation details through both Models and Services Mapping and technologies integration.



1 INTRODUCTION

The scope of this document is the evaluation of solutions for integrating already existing tools for assessment and planning within the DESTRIERO platform.

The analysis provided in D5.1 based on DESTRIERO previous activities output, identified main platform architecture principles that require, for external systems to be connected, an adapting layer when they cannot be directly modified to support integration.

Analysing provided D2.1 User Requirements, D2.2 Scenario and D4.3 defined Use Cases of the platform, the provided details were not sufficient to describe the required cooperation activities and communication steps between all involved entities, so the definition of a Demonstration Scenario has been performed in order to identify interactions between users, systems and platform. After this required step it has been possible to identify and select all required information and data sources to be adapted to the platform. Latest action to be performed is to identify selected systems and sources operations to be invoked from platform in order to request services or retrieve information data: these provide Adapter Interfaces to be evaluated inside the document within possible high level Adapters Designs to be considered in T6.2 activities.

Deliverable results have to be taken in consideration in D5.3 where selected systems could be extended in order to directly provide support to platform for identified Demonstration Scenario interactions. More, DESTRIERO HMI Design process in T5.4 has to cover all required user interactions, and identified coordination steps to be forwarded to selected systems adapted to the platform. Finally, the adapter designs provided in Chapter 4, which transformation layers should be based on described source mappings, will be taken in consideration in WP6 development activities and WP7 integration activities.

1.1 Document Organisation

This document is divided in the following sections:

Chapter 2 – Information Sources Evaluation: in this chapter an analysis of identified information services (defined in D4.3) has been performed providing details on information sources and tools technologies and interaction paradigms.

Chapter 3 – Demonstration Sources Identification: based on a Demonstration Scenario to be validated, a subset of provided Information Sources (Defined in D4.1) have been identified, providing details on Users interactions with DESTRIERO Platform and between selected sources and tools.

Chapter 4 – Adapters Design: in this chapter, demonstration scenario sources/tools subset adapters have been designed, providing details on each source/tool exposed/required service and data model mapping.



1.2 Reference Documents

Document name
[D2.1] UPVLC (ed.) (2014): <i>D2.1 – Requirement specification and collaboration needs</i> . DESTRIERO deliverable to T2.1 and T2.2.
[D2.2] UPVLC (ed.) (2013): D2.2 – Detailed Scenario definition. DESTRIERO deliverable to T2.3.
[D3.1] Valiente, M. C., Escalera, A. (2014): D3.1 – DESTRIERO Data Source Identification Report. DESTRIERO deliverable to T3.1
[D4.1] Goujon, B., Vandieken, T. (2014): D4.1 – Information Demand and Information Origin. DESTRIERO deliverable to T4.1
[D4.2] FHG (2014): D4.2 – Model of information interoperability. DESTRIERO deliverable to T4.2
[D4.3] SELEX-ES (2015): D4.3 – Services for Functional interoperability. DESTRIERO deliverable to T4.3
[D5.1] UPVLC (2014): D5.1 – DESTRIERO Architecture Report. DESTRIERO deliverable to T5.1
[D5.3] CINI (2015): D5.3 – Design of Tools extensions and improvements. DESTRIERO deliverable to T5.3
[DALA1] United Nations Economic Commission for Latin America and the Caribbean (ECLAC), (2013), Handbook for Estimating the Socio-economic and Environmental Effects of Disasters: Introduction. Available online at http://siteresources.worldbank.org/INTDISMGMT/Resources/intro.pdf
[DALA2] GFDRR (2010), DaLa: Damage, Loss and Needs Assessment, Guidance Notes. Available online at http://www.gfdrr.org/sites/gfdrr/files/publication/TTL%20Vol1_WEB.pdf
[DALA3] GFDRR (2013), Seychelles Damage, Loss and Needs Assessment (DaLa), 2013 Floods. Available online at http://www.gfdrr.org/sites/gfdrr/files/Seychelles_DaLA_2013_Floods.pdf

1.3 Table of Acronyms

Acronym	Description
MIRA	Multi Cluster/Sector Initial Rapid Assessment Approach
PDNA	Post Disaster Needs Assessment
DALA	Damage and Loss Assessment
RID	Radionuclide Identifier



Acronym	Description
HPGe	High Purity Germanium
GPS	Global Positioning System
UAV	Unmanned Aerial Vehicle
HP	Health Physics
BEGe	Broad Energy Germanium Detectors
FTP	File Transfer Protocol
ETL	Extract, Transform and Load
POI	Point Of Interest

1.4 Definition of Terms

Term	Definition
Information Source	The information source is a provider of information and can be identified as an extension of Actor term.
Information service	An Information Service is a service, which provides (serves) data/knowledge/information somehow. In the DESTRIERO Context, Information Services are the services provided to DESTRIERO Users in order to Provide/Retrieve information/knowledge.
Function	Relevant functions derived from [D2.1] and [D2.2] assigned to the PDNA framework. A function in DESTRIERO Platform is a recovery or reconstruction activity that is performed internally or by an organization or individual. Examples of such functions are needs assessments, information analysis, or decision making.
Functionality	In information technology, functionality (from Latin functio meaning "to perform") is the sum or any aspect of what a product can do for a user. In the DESTRIERO Context, the product is the DESTRIERO Platform meanwhile the aspects are the provided outputs in terms of interactions and information.



2 INFORMATION SOURCES EVALUATION

In the next paragraphs an analysis of each Information Service relative Source identified in D4.3 will be performed, giving attention to each required input and provided output legacy data format and possible relation with identified D4.2 standard models.

An analysis of D4.3 activities has been performed in order to identify all sources exposed services and possible sources/tools required information.

2.1 Information Sources, 3rd Party Systems and Other Data Sources

The following Information Sources (detailed in D4.1) and corresponding services could be plugged to the DESTRIERO platform. Each information source is characterized by an id that univocally identifies the source. Three types of sources have been identified:

- Information Sources: external sources that can provide information to each platform connected system;
- Data Sources: external sources that can provide data from which information can be extracted;
- 3rd Party Systems: external sources that can provide both information and services to each platform connected system.

Once sources have been divided and described, an analysis of each of them has been performed.

2.1.1 Information Sources

The list of identified information sources is here provided.

- **[IS_01] UNOCHA (<http://www.unocha.org/>):** The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) produces an array of reports and publications, from in-depth analytical papers, to daily situation reports on major new crises. When an emergency occurs, OCHA's information management officers immediately start working with key partners to produce standard information products to support coordination of all the humanitarian organizations and the response operation.
- **[IS_02] WHO (<http://www.who.int/en/>):** The World Health Organization (WHO) is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters. The WHO provides regularly articles and reports on health, and has collaborated to the TRIAMS (Tsunami Recovery Impact Assessment and Monitoring System).



- **[IS_03] GDACS (<http://www.gdacs.org/>):** Global Disaster Alert and Coordination System (GDACS) is a cooperation framework under the United Nations umbrella. It includes disaster managers and disaster information systems worldwide and aims at filling the information and coordination gap in the first phase after major disasters. GDACS provides real-time access to web-based disaster information systems and related coordination tools. The GDACS data platform provides the facility to access event specific resources, such as links, images, shapefiles, KML files, WMS services and RSS via RSS or a SOAP API.
- **[IS_04] ReliefWeb (<http://reliefweb.int/>):** ReliefWeb has been the leading source for reliable and timely humanitarian information on global crises and disasters since 1996. ReliefWeb is a specialized digital service of the United Nations Office for the Coordination of Humanitarian Affairs (OCHA). It provides reliable disaster and crisis updates and analysis to humanitarians, so they can make informed decisions and plan effective assistance. ReliefWeb offers information as Reports, such as analysis, appeals, assessments, situation reports, but also maps information and financial data. It provides an API to allow querying and retrieval of disaster and crises updates in JSON format. Humanitarians to enable decision-making can access reports, analysis, documents, info-graphics, maps and other content via the API.
- **[IS_05] COPERNICUS-EMS (ex GIO EMS) (<http://emergency.copernicus.eu/mapping/>):** The GIO Emergency Management Service (GIO EMS) is the first Copernicus service to become operational. Copernicus (previously Global Monitoring for Environment and Security – short GMES) is an EU programme aimed at developing European information services based on satellite Earth Observation and in situ (non-space) data. The Copernicus Emergency Management Service portal can provide reference maps of the territory and assets prior to the event as geo-referenced Maps (GeoTIFF, Geo-referenced JPEG file format (with worldfile) and metadata file) or Vector Files (ESRI shapefiles with projection file (.prj), Google Earth KML (or KMZ) format and metadata file). It can also provide post disaster delineation maps of the event extent (and of its evolution) along with grading maps of the damage grade (and of its evolution) in the same file formats of the reference maps.
- **[IS_06] CODS:** The CODs may provide the Humanitarian Profile (estimate updated and revised through scenario development) and Population Statistics. It may also provide geographic statistics (Administrative boundaries, populated places, transportation network, hydrology and hypsography) which will most likely not change subsequent to the disaster. These CODs can be used in conjunction with visual maps for damage assessment and decision-making. The input formats can vary and may be in the form of .CSV, Excel (xls and xlsx), shapefiles, GeoTIFFs, KML etc.



- **[IS_07] REDHUM:** Redhum is an agency aimed to increase cooperation in disaster reduction, preparation and response through information exchange, joint planning and common activities. It disseminates reports, weekly notes, news and maps containing relevant information regarding the impact of the disaster.
- **[IS_08] UNICEF:** UNICEF maintains a database containing up-to-date statistical economic and social data from 195 countries and territories, with particular reference to children's well-being. Databases presently available on this site include:
 - Child Survival and Health
 - Child Nutrition
 - Maternal Health
 - New-born Care
 - Water and Sanitation
 - Education
 - Child Protection
 - HIV/AIDS

Users can choose their countries and indicators to build tables on the fly, or download the numbers into an Excel spreadsheet (xlsx format).

- **[IS_09] UN Data API:** United Nations maintains numerous databases, tables and glossaries containing over 60 million data points cover a wide range of themes including Agriculture, Crime, Education, Employment, Energy, Environment, Health, HIV/AIDS, Human Development, Industry, Information and Communication Technology, National Accounts, Population, Refugees, Tourism, Trade, as well as the Millennium Development Goals indicators. All data is accessible via API, and can be queried to return the data in several formats including JSON, XML, and CSV.
- **[IS_10] Global Health Observatory:** The GHO data repository contains an extensive list of indicators, which can be selected by theme or through a multi-dimension query functionality. It is the World Health Organization's main health statistics repository. The Global Health Observatory is built on top of a RESTful web service which allows to retrieve data in CSV, Excel and JSON format.
- **[IS_11] 3W:** The 3W Contact Management Directory is usually setup by UNOCHA immediately on site after a crisis occurs in order to facilitate the assessment of available capacities (technical resources, knowledge, staff etc.). Data are provided in HTML, PDF and KML format.
- **[IS_12] OpenWeatherMap:** it is an online service that provides free API to weather data including current weather data, forecasts and history. Data are provided through API in HTML, JSON, XML format. OpenWeatherMap provides also many kinds of



weather maps including Precipitations, Clouds, Pressure, Temperature, Sea level pressure, Wind and many others through OGC compliant services (WMS/WFS).

- **[IS_13] IRIN News:** The IRIN News Portal contains analysis and news on the various humanitarian activities taking place at present and is used predominantly by humanitarian actors. It does not have a direct API other than RSS feeds. The RSS feed content may be semi-structured and contains general information, photos and summary information.
- **[IS_14] UNOSAT:** UNOSAT provide a mapping service to facilitate the availability satellite mapping activities of interest (links on a HTML page) to GDACS stakeholders. The MAPs are issued weekly are based on contributions from map-producing entities and GDACS partners. These UNOSAT maps may be available within the VOSOCC discussion feeds or event details.
- **[IS_15] AID Worker Security:** The Aid Worker security database is searchable via a link on the Aid Worker Security Website. A search criterion can be set and the results displayed in HTML or for download as an Excel spreadsheet. The search filters that can be set are a date range, country, months, institution type, and methods of attack, attack context, locations and staff type.
- **[IS_16] FODS:** The Fundamental Operational Datasets (FODs) are datasets that are relevant to a humanitarian operation, but are more specific to a particular sector or otherwise do not fit into one of the seven COD themes (e.g. schools, flood extents, security incidents, wells, etc.). These datasets are required to support multiple cluster/sector operations and compliment the common operational datasets.
- **[IS_17] VOSOCC Discussion Feeds:** The VOSOCC also provides emergency discussion feeds (HTML pages) to be made available to responders.
- **[IS_18] People in Aid:** The PeopleInAid website provides online resources to help improve organizational effectiveness within the humanitarian and development sector worldwide by advocating, supporting and recognizing good practice in the management of people.
- **[IS_19] HAP:** The HAP website provides online material and reports to help organizations design, implement, assess, improve and recognize accountable programs for people affected by disasters, conflict, poverty, or other crises. It outlines the policies, processes, procedures and practices that an organization needs in order to be accountable to crisis-affected communities.



- **[IS_20] ECLAC:** The ELAC website provides supporting studies, research and other support activities for Latin America and the Caribbean. There is also a CEPALSTAT RESTful API service available from the site which provides statistical information regarding Latin America and the Caribbean countries collected, systematized and published by ECLAC. The CEPALSTAT API provides access to over 1,000 indicators specific programmatically, allowing the user to define queries in different ways, using parameters to define specific requirements and applications of interest.
- **[IS_21] GFDRR:** The GFDRR website provides publications and information to help countries reduce their risk to natural disasters and help mainstream Disaster Risk Reduction. It also publishes various documents and tools (including the PDNA and the DaLA Methodology) to help support the recovery and reconstruction phase.
- **[IS_22] AIDMI:** The AIDMI website [AIDMI] provides online resources regarding the Institutes research and planning activities towards disaster mitigation. It contains various publications, links and content online. It is specifically geared towards India, but the lessons and knowledge gathered, could inform and help similar situations in other locations.

The following Information Sources are dedicated to specific parts of the world or to developing countries, so they seem to be less relevant in our European context: **ECLAC** (Economic Commission for Latin America and the Caribbean), **GFDRR** (Global Facility for Disaster Reduction and Recovery, to helping developing countries), **IRIN News** (Integrated Regional Information Networks, which cover the parts of the world often under-reported, misunderstood or ignored), **AIDMI** (All India Disaster Mitigation Institute), **REDLAC** (The Risk, Emergency and Disasters Task Force Inter-Agency Workgroup for Latin America and the Caribbean), **UNDP** (The United Nations Development Programme), **UNICEF** (The United Nations Children's Fund).

The following Information Sources seem more adapted to support the humanitarian organisation in preparation phases than to be used in a post-disaster phase: **HAP:** (Humanitarian Accountability Partnership), **ALNAP** (Active Learning Network for Accountability and Performance in Humanitarian Action), **People In Aid**.

The following organizations represent other important raw information sources:

- **Administrations (pre-disaster information):** a lot of important data related to the normal situation (pre-disaster data) could be provided by administrative services in Europe: boundaries, populated places, city maps, transportation infrastructures, health infrastructures, demographic indicators...
- **Local authorities (post-disaster information):** pieces of information related to the post-disaster situation (population targeted on each city/area) could be provided by local decision-makers like Mayors.



- **First responders and local authorities (during disaster information):** Specific and updated data related to the current situation (availability of health services, closed roads, flooded areas...) are mainly provided by local authorities with first responders (Police services, fire brigades, NGOs...).

2.1.2 Data Sources

It is the necessity to considerate as valid sources also the elements that are reported as follows and that are the results of the D3.1. All the data sources here proposed can be categorized in sensors, audio and video, social media and drones:

Sensors:

- **[SENS_01] Gamma Camera:** is a real-time portable gamma ray imaging system that creates images of two different wavelengths of photons (visible and gamma) and superimposes them. This allows the user to locate gamma radiation arriving at the sensor. The use of this sensor is really important for CBRN evaluations in order to understand the level of radiation that affect a disastered area,
- **[SENS_02] Colibri:** Colibri is a comprehensive health physics instrument with unique characteristics that can lower the dose exposure of HP technicians and other workers in radiation areas. The "always on" gamma dose feature ensures the worker is always informed – even when using the Colibri for contamination surveys with attached probes. The Colibri also allows for wireless data collection from pre-positioned detectors that can be placed in radiation areas – eliminating the need to attach probes, VLD get close to the source – then manually transcribe data. Walk into the room – and Colibri performs the survey for you – allowing exit from the rad area in a fraction of the normal time,
- **[SENS_03] Falcon 5000:** The Falcon 5000® is a state-of-the-art portable Radionuclide Identifier (RID) based on a High Purity Germanium (HPGe) detector. It quickly and accurately answers: "Is there a radiation source present?", "Where is it?", and importantly "What isotopes are emitting the radiation?" The Falcon 5000 accomplishes these goals by combining the best resolution HPGe detector technology with ultra-low microphonic electrical cooling. In addition to the highest resolution detector on the market, the Falcon 5000 integrates a unique BEGe detector that is superior in efficiency and lower in cost than standard coaxial detectors,
- **[SENS_04] Generic Camera:** in order to be able to take decisions on damage assessment and recovery and reconstruction there is the need to acquire images and pictures of the damaged area directly from the field. Cameras could be divided into:



- **Portable Camera:** with these type of cameras units on the field can send images while they are working or UAVs can take images from isolated or dangerous/contaminated areas,
 - **Handheld Camera:** with this kind of cameras engineers' teams can take images and videos while they assess the damage of building or infrastructures on the field. These images are uploaded to a server available for DESTRIERO system in order to be accessed at any time by the decision makers,
 - **Infra-red Camera:** thermal imaging provides recovery and reconstruction agencies with critical insight not available from standard colour photography. This kind of imaging could be used for giving important information that would not be available with normal cameras, e.g. how much liquid is in a storage tank or making inferences of tanks (fuel or water) that are full, tanks that are empty and tanks that are leaking.
- **[SENS_05] Global Positioning Systems (GPS):** Current global positioning systems allow the location whatever kind of building, infrastructure or person with a high accuracy. This fact makes that these global positioning system such as the U.S. Global Positioning System (GPS) and GALILEO (the European global navigation satellite system) are very useful for the recovery and reconstruction tasks,
 - **[SENS_06] Extensometer:** An extensometer is a sensor used to measure changes in the length of an object. Therefore, extensometers could be used in the DESTRIERO system as a device that can provide valuable information for structural damage assessment,
 - **[SENS_07] Inclinometer:** An inclinometer is a motion sensor used to monitor subsurface movements and deformations. They are usually made of a cylindrical thin and long case, which are drowned in the terrain to be measured. The movement of the ground causes the casing to deform, hence to measure the entity of the movement itself,
 - **[SENS_08] Optical Sensor:** Satellite imaging sensors are devices, mounted on orbiting platforms, able to collect information about the Earth's surface. Optical remote sensing makes use of visible, near infrared and short-wave infrared sensors to form images of the earth's surface by detecting the solar radiation reflected from targets on the ground,



- **[SENS_09] Synthetic Aperture Radar (SAR):** Synthetic Aperture Radar (SAR) image data provide different information from that of optical sensors operating in the visible and infrared regions of the electromagnetic spectrum. SAR data consist of high-resolution reflected returns of radar-frequency energy from terrain that has been illuminated by a directed beam of pulses generated by the sensor.

Audio-Video:

- **[AV_01] Podcast:** a podcast is a digital audio or video file or recording, usually part of a themed series that can be downloaded from a website to a media player or computer,
- **[AV_02] YouTube:** YouTube is a video-sharing website, created by three former PayPal employees in February 2005 and owned by Google since late 2006, on which users can upload, view and share videos.

Social Media:

- **[SM_01] Facebook:** is a popular free social networking website that allows registered users to create profiles, upload photos and video, send messages and keep in touch with friends, family and colleagues,
- **[SM_02] Twitter:** Twitter is an online social networking service that enables users to send and read short 140-character messages called "tweets". Registered users can read and post tweets, but unregistered users can only read them. Users access Twitter through the website interface, SMS, or mobile device application.

2.1.3 3rd Party Systems

The identified 3rd party systems and tools can be enumerated as follows. Each 3rd party system and tool is identified with a unique id:

- **[3PS_01] ne.on (CBRN Module):** ne.on advance is a Command and Control (C2) system developed by AMPER Programas (currently THALES Programas) for military use. ne.on advance provides the following functionality:
 - Terrain analysis (3D, visible/hidden areas, altimetry, contour lines, distances and area calculation...)
 - Tactical capabilities:
 - Conduction and planning capabilities
 - Quick sketching with a free hand drawing tool
 - CBRN analysis (detection, estimation and monitoring)
 - Interoperability



-
- On-The-Move (OTM) interface for tactile devices and At-The-Halt interface for desktop applications.
 - **[3PS_02] Myriad:** A multi-criteria decision analysis tool and methodology developed by TRT. It can support the decision process in the DESTRIERO context, during RPP and PDNA phases.
 - **[3PS_03] WebGIS:** The WebGIS System is a platform for geographic data publication over the internet and sharing through a browser-based interface whose main aim, in the framework of DESTRIERO project, is to show on a map all the relevant information which allow to give to the user awareness picture of the post-disaster recovery and reconstruction phase.
 - **[3PS_04] B2Mobile:** Business2Mobile (B2M) is a messaging platform that can be used for sending SMS messages, Push Notification messages, email and voice messages to end users' handsets. B2M acts as a mobile messaging gateway which will deliver various message types (SMS, Push Notification, email, voice message) to end user handsets using the appropriate mobile network carrier (for SMS messages) or the appropriate Push Notification channel (Apple's APNS or Google Cloud Messaging), or the relevant provider for email or voice messaging.
 - **[3PS_05] STATISTICA (StatSoft):** STATISTICA Base offers a comprehensive set of essential statistics in a user-friendly package. It provides several statistical analysis methods like Principal Components and Classification Analysis, Cluster Analysis Techniques, Classification Trees (Proprietary Software).
 - **[3PS_06] SPSS (IBM):** SPSS predictive analytics software allows to predict with confidence what will happen next so that you can make smarter decisions, solve problems and improve outcomes. Its sub-tools SPSS Categories, IBM SPSS Neural Networks and SPSS Regression help to classify data into groups. (Proprietary Software).
 - **[3PS_07] R (GNU Project):** R is a free software environment for statistical computing and graphics. R provides a wide variety of statistical (linear and nonlinear modelling, classical statistical tests, time-series analysis, classification, clustering, ...) and graphical techniques, and is highly extensible. (Free software, GNU General Public License).



- **[3PS_08] Enterprise Portfolio Simulator (ProModel):** Enterprise Portfolio Simulator uses modelling technology to predict the performance of project portfolios while identifying schedule, financial, and resource risks. These risks are then mitigated virtually, using scenario planning, to ensure more projects can be included in the portfolio, while being completed on-time and within organizational constraints. (Proprietary Software).
- **[3PS_09] 1000Minds:** 1000Minds and its tools are for decision making, prioritization and discovering stakeholders' preferences via conjoint analysis. Depending on application, 1000Minds can also help you think about the value for money of alternatives and allocate budgets or other scarce resources. (Proprietary Software).
- **[3PS_10] D-Sight Desktop:** D-Sight Desktop offers multi-criteria decision analysis tools: Collaborative Decision-Making and Strategic Sourcing Analysis. Coll (Proprietary Software).
- **[3PS_11] DecisionTools Suite 6.0 (Palisade):** The DecisionTools Suite is an integrated set of programs for risk analysis and decision making under uncertainty that runs in Microsoft Excel. The DecisionTools Suite includes @RISK for Monte Carlo simulation, PrecisionTree for decision trees and TopRank for "what if" sensitivity analysis. In addition, the DecisionTools Suite comes with StatTools for statistical analysis and forecasting, NeuralTools for predictive neural networks, and Evolver and RISKOptimizer for optimization. (Proprietary Software).
- **[3PS_12] Expert Choice (Expert Choice):** Expert Choice provides two tools to help organization handle the complexity of important decisions. Expert Choice Comparion™ Solution is a web based easy to use solution for collaboration and prioritization. Expert Choice Riskion™ Solution provides a structured risk management process with superior measurements techniques. (Proprietary Software).
- **[3PS_13] Geo-Crowdsourcing System (e-GEOS):** The Geo-Crowdsourcing System is a platform which analyses the content of the feeds provided by the main social networks, like Twitter, in order to extract any kind of useful information (stories, photo, videos, etc.) which could help the user to collect more details about the post disaster situation in the area of interest.



2.1.4 Analysis of identified Sources

Each information sources is here further detailed according to the following template:

Table 1 – Source Description Table Template

ID	The id assigned to the information source or 3 rd party system (e.g. IS_xx or 3PS_xx)
Name	The name of the identified source or 3 rd party system
Users	If any, specify here who uses the system and for which scopes.
Users Interactions	If any, define in which ways the users can interact with the information source (e.g. by clicking a button, by submitting data etc.) or 3 rd party system
Types of Accesses	If any, insert here if the information sources or 3 rd party system is restricted or not, if it needs some access processes to be accomplished or not, etc.
Types of interactions	Define here if the interaction with the information sources or 3 rd party system is synchronous or asynchronous.
Technology used	The technology through which the information source or 3 rd party system is available (e.g. Web Services, HTTP, REST etc.)
Communication Protocol	The protocol that is in use to get the information from the source or 3 rd party system.
Information Formats	The output for the information source or 3 rd party system (e.g. XML, JSON, SOAP etc.)
Type of Source	Define if the information sources or 3 rd party systems are Open Source / Freeware / Proprietary
References	Put here any references to web sites related to the information source or 3 rd party system
Notes	Please add here all kind of stuff that is not appropriate to be inserted in previous sections.



2.1.4.1 3rd Party Systems

ID	[3PS_01]
Name	ne.on advanced
Users	The platform is a Command and Control system designed to be used by military personnel.
Users Interactions	The user can interact with the ne.on platform through different HMI. The system is made up of several desktop applications.
Types of Accesses	The system is usually deployed in an isolated network due to security reasons so it is not possible to connect to it directly. The interconnection with other systems is possible through special applications that have one connection to ne.on advance database and other connection with the external system (e.g. a computer with two network interfaces, one of them connected to the private ne.on advance network and the other connected to the Internet).
Types of interactions	ne.on advance is a client/server system made up of several desktop applications. Interaction could be synchronous and asynchronous.
Technology used	There are no web services or REST API exposed.
Communication Protocol	Probably HTTP/HTTPS. The decision has to be agreed during the adapter implementation.
Information Formats	<p>The information that is managed by the ne-on platform concern mainly JC3IEDM data. The JC3IEDM entities are putted inside an XML representation and characterize the payload that is transferred to/from a specific adapter.</p> <p>The xml JC3IEDM entity representation is inserted as a payload of an EXDL message (using the tag "xmlContent") that is used to send/receive information to/from the DESTRIERO platform.</p>
Type of Source	Proprietary 3 rd Party System of Thales Programas
References	ne.on advance is almost a "new-born" concept and so there is not yet a reference for this product.
Notes	Thales Programas proposed different way of integration. According to the



	<p>scenario elaborated in WP2, a possible interaction with ne.on could be:</p> <ol style="list-style-type: none">1. Connect ne.on advance to DESTRIERO through a specific adapter (connected at the same time to ne.on advance database and DESTRIERO),2. Get some information regarding the disaster from the DESTRIERO platform (location of the disaster, date-time and any other piece of information supported currently by ne.on advance),3. Use this information in ne.on advance. For example it should be possible to: use a CBRN tool to estimate the contaminated area after a Radiological disaster (WP2 scenario includes this type of incident), or change the operational status of some of the facilities within the affected area. These facilities (location, type and initial operational status) could be provided by DESTRIERO platform as mentioned in point 2.4. Send the updated information in ne.on advance to DESTRIERO platform (e.g. affected areas estimated by the CBRN tool, current operational status of facilities...)
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ID	3PS_02
Name	Myriad
Users	Decision-maker
Users Interactions	<p>In a generic use, the user selects one or several alternatives to be evaluated, and clicks on a button to obtain the evaluation of the alternative(s) by Myriad.</p> <p>In the DESTRIERO context, to evaluate the relevance of reconstruction projects in portfolios, the user could just click on a button to obtain the best portfolio of reconstruction projects, evaluated by Myriad.</p>
Types of Accesses	The use of the service is dedicated to the decision-maker, not to all DESTRIERO platform end-users, so access could be restricted.
Types of interactions	Asynchronous.
Technology used	For the DESTRIERO use of Myriad, the technology through which Myriad will be the one decided by partners in charge of the topic.



Communication Protocol	There is no specific communication protocol associated to Myriad.
Information Formats	The output format could be the list of the priority projects.
Type of Source	Proprietary 3 rd Party System of Thales SA
References	
Notes	

ID	3PS_03
Name	WEBGIS System
Users	-
Users Interactions	<ul style="list-style-type: none"> • Browsing a map using zoom and pan controllers • Retrieving information by clicking on geographical data/features showed on the map (buildings, hydrology, Aols, assets etc.) • Searching data/features by several filtering criteria (area, attributes etc.) • Activating and de-activating visualization of overlays on the map • Exporting data in several format: kml, shapefile • Viewing and inspecting satellite data (optical or radar raster data) • Applying specific symbology to a layer/overlay
Types of Accesses	If needed, an authentication system can be provided
Types of interactions	Synchronous
Technology used	HTTP, HTML, Javascript, Openlayers/Leaflet, Web Services Restful and OGC compliant (WMS, WFS, WCS)
Communication Protocol	HTTP



Information Formats	<ul style="list-style-type: none">• JPEG, GIF, GEOTIFF for raster data,• XML, GML, JSON for vector data
Type of Source	Open source
References	-
Notes	-

ID	[3PS_04]
Name	B2M (Business2Mobile)
Users	<p>Saadian has been working with some of the UK and Ireland's leading companies and organisations for the last 15 years. B2M has been used by over 400 public and private sector organisations that have come to regard it as a vital means of communicating with employees, suppliers and customers. Ten years on, they still work with some of the same customers. SAADIAN solutions are used by:</p> <ul style="list-style-type: none">• Irish Defence Forces,• Irish Fire Services,• English and Welsh police forces• Irish Health Service,• Irish Revenue. <p>As it can be noticed the B2M messaging solution applies to different kind of users. In particular, it well fits in all the situations in which there are different necessities to share information through SMS or mobile push notification.</p>
Users Interactions	<p>Mobile users that have been added as contacts or to a group into the B2M administrative console can receive messages as SMS on their personal mobile phone without the need of any software. Each user can reply back to the administrative console by answering to the received SMS.</p> <p>B2M provides also a web based front-end system for administrating groups of contacts, individual contacts, administering message templates and creating messages. It also provides the facility to schedule messages that can be sent at a later date.</p> <p>B2M also provides an option to send pager type alerts to mobile devices via SMS or Push Notification (iPhone only). The mobile devices require an</p>



	<p>application to be installed to use this feature.</p> <p>All the administrative functionalities can be accessed also through Web Services (SOAP) and a subset of functions are available through a REST API. Expanding the coverage of the REST API will make integration with the DESTRIERO platform easier, as it provides a lightweight API with custom data format (JSON) and structure.</p>
Types of Accesses	<p>The B2M services are accessible through a Web HMI that enables DESTRIERO users to send push notifications or SMS messages. The access to the SAADIAN B2M administrative console is restricted via a user login that requires a username and a password. Once the login operation has been accomplished, the admin can start the session that is characterized by a limited temporal validity in case of admin inactivity.</p>
Types of interactions	<p>Asynchronous operations</p>
Technology used	<p>The entire APIs are accessible via Web Services by using the SOAP protocol.</p> <p>The RESTful Services will be accessed through the HTTP/HTTPS protocol and will provide data in a JSON format.</p>
Communication Protocol	<p>All the web services are exposed through HTTP or HTTPS requests.</p>
Information Formats	<p>From the admin console it is possible to send SMS text messages.</p> <p>Using web services all the information is encapsulated in a SOAP message.</p> <p>Using REST APIs all the data is provided in a JSON format.</p>
Type of Source	<p>Proprietary 3rd Party System of Saadian Technologies Ltd.</p>
References	<p>http://www.saadian.com</p>
Notes	<p>On the SAADIAN web site, there is the opportunity to activate a free account.</p> <p>Saadian proposes to expand the REST API to cover all the functionality and thus enable easier integration with DESTRIERO.</p>
ID	<p>3PS_05</p>



Name	STATISTICA
Users	An analyst having a background on statistics can use the tool and generate relevant data analysis. Other users can just access to the resulting data analysis.
Users Interactions	The analyst has to import data, to select and tune the relevant analysis method and then has to run it to obtain the result of the analysis. Other users can view on the IHM analysis results.
Types of Accesses	Access is not restricted, but limited by the tool license.
Types of interactions	Asynchronous.
Technology used	A version of the tool (Statistica Enterprise Server) proposes an access through a browser.
Communication Protocol	HTTP
Information Formats	Tables, statistics, graphs
Type of Source	Proprietary 3 rd Party System of Statsoft
References	http://www.statsoft.fr/index.php
Notes	

ID	[3PS_06]
Name	IBM SPSS
Users	-
Users Interactions	<ul style="list-style-type: none"> • Formatting tables. • Regression models. • Category analysis. • Generate maps and graphics.



	<ul style="list-style-type: none"> • Classification trees. • Validate Data. • Complex statistical analysis.
Types of Accesses	Desktop software.
Types of interactions	User must add information in SPSS application and choose the analysis.
Technology used	Multiplatform system developed in Java.
Communication Protocol	-
Information Formats	Multiple input formats and multiple output formats. In addition proprietary files (.sav, .spo, .sps and .sbs)
Type of Source	Proprietary 3 rd Party System of IBM
References	http://www-01.ibm.com/software/analytics/spss/
Notes	Additional modules for not supported formats and specific reports.

ID	[3PS_07]
Name	R
Users	-
Users Interactions	<ul style="list-style-type: none"> • Handling effective data and facility storage. • Calculate Matrix. • Multiple modules for statistical analysis. • Multiple graphical modules.
Types of Accesses	Desktop software.
Types of interactions	User must add information in R application and choose the analysis.



Technology used	Multiplatform system developed in R, but it is possible to develop libraries in C, C++ or Fortran.
Communication Protocol	-
Information Formats	Multiple input formats and multiple output formats. (XML, CSV, sql tables, binary data...)
Type of Source	GPL (Free software)
References	http://www.r-project.org/
Notes	A lot of free modules developed. Possibility of develop own modules.

ID	3PS_08
Name	Enterprise Portfolio Simulator (ProModel)
Users	Any User
Users Interactions	Definition of specific scenario to be analysed
Types of Accesses	Desktop software.
Types of interactions	Manual Interaction with proprietary system
Technology used	Proprietary
Communication Protocol	N/A
Information Formats	Proprietary
Type of Source	Proprietary 3 rd Party System of ProModel



References	https://www.promodel.com/Solutions/HospitalPatientFlow
Notes	

ID	3PS_09
Name	1000Minds
Users	Any User
Users Interactions	Definition of specific scenario model to be analysed
Types of Accesses	Desktop software
Types of interactions	Manual Interaction with proprietary system
Technology used	Proprietary
Communication Protocol	N/A
Information Formats	Proprietary
Type of Source	Free trial with tutorials and examples
References	https://www.1000minds.com/
Notes	

ID	3PS_10
Name	D-Sight Desktop
Users	



Users Interactions	Through a web-based HMI, Users are allowed to: <ol style="list-style-type: none"> 1. Create a project 2. Define and insert alternatives, choices or possible options 3. Define comparison factors 4. Insert criteria weights 5. Perform analysis evaluating alternatives 6. Inspecting results which can be shown in several kinds of diagrams (i.e. ranking chart, ranking table, columns chart, spider web-chart etc.) 7. Export reports
Types of Accesses	Signing up and Authentication required
Types of interactions	Synchronous
Technology used	HTTP, HTML. No Web Services provided
Communication Protocol	HTTP
Information Formats	HTML, PDF, Excel
Type of Source	Free trial with tutorials and examples
References	http://www.d-sight.com/
Notes	-

ID	3PS_11
Name	DecisionTools Suite 6.0 (Palisade)
Users	An analyst having a background on statistics can use the tool and generate relevant data analysis. Other users can just access to the resulting data analysis.



Users Interactions	The analyst has to import data, to select and tune the relevant analysis method and then has to run it to obtain the result of the analysis. Other users can select elements on IHM to obtain analysis results.
Types of Accesses	Access is not restricted, but limited by the tool license.
Types of interactions	Asynchronous.
Technology used	No information on the technology used.
Communication Protocol	No information on the communication protocol.
Information Formats	Excel tables and graphs.
Type of Source	Proprietary 3 rd Party System of Palisade
References	http://www.palisade.com/
Notes	

ID	[3PS_12]
Name	Expert Choice Comparion and Riskion
Users	<p>Comparison Core is a collaborative web application for decision makers. It's easy to use, intuitive workflow allows teams to define decision criteria and identify potential solutions. Comparison Core tracks all participants' judgments, data, and comments— allowing the team to focus on objectives, analysis, and results.</p> <p>The Riskion solution is not yet available (The expert choice software house has been developing it at the time of writing this deliverable). So, it is not yet possible to define users' interactions or further details on this solution. All the information that is reported into the next fields refers to the Comparion solution.</p>



Users Interactions	Users can access the software's functionalities by opening a web browser and using a WebHMI.
Types of Accesses	The access to the web platform is restricted with a username and a password.
Types of interactions	Interactions are asynchronous through HTTP web requests.
Technology used	<p>No web services or REST API are exposed.</p> <p>End-to-end web based application available as "Software as a Service" configuration, hosted at Expert Choice's secure outsourcing facility. It is possible to start up the system with zero configurations, zero footprints and zero executable.</p> <p>It is possible also to adopt a solution for a self-host deployment (available on request), in this case the installation and deployment of Comparion Core is accomplished inside customers' architectures and it requires IIS6/7 Asp.Net2.0 framework. This solution is available as an annual license.</p>
Communication Protocol	All the communication is based on the HTTP/HTTPS protocol. From the website it is suggested to submit requests and to use the WebHMI only if a strong internet connection is available.
Information Formats	N.A.
Type of Source	Proprietary 3 rd Party System of Expert Choice
References	<p>The core functionalities and description are available at:</p> <p>http://images.expertchoice.com/wp-content/uploads/ExpEng/xres/uploads/resource-center-documents/Comparion_one_sheet.pdf</p>
Notes	Supported Browsers: MS Windows® (Internet Explorer® 5.x or newer)

ID	3PS_13
Name	Geo-CrowdSourcing System
Users	-



Users Interactions	<ul style="list-style-type: none"> • Browsing geo-referenced feeds provided by main social network and showed on the map using an appropriate symbology • Browsing the map using zoom and pan controllers • Retrieving text and media (audio, video) associated with each feed by clicking on it • Creating specific filtering-criteria to retrieve and visualize feeds related to a certain area of interest or a particular disaster
Types of Accesses	If needed, an authentication system can be provided
Types of interactions	Synchronous
Technology used	HTTP, HTML, Javascript, Openlayers/Leaflet, Web Services Restful, FME for retrieving feeds from social network (see http://www.safe.com/)
Communication Protocol	HTTP
Information Formats	JSON,XML
Type of Source	Open source
References	-
Notes	-

2.1.4.2 Information Sources

ID	IS_01
Name	UNOCHA
Users	Humanitarian Organizations, Governmental Organizations and Non-Governmental Organizations.
Users Interactions	Email subscription to humanitarian updates by submitting a form. It is important to put in evidence the fact that in these emails not all the information is of interest or necessary as already detailed in D4.2 paragraph 5.3.2).



	By clicking on the links of the humanitarian reports, listed at the URL provided in the reference field of this table, the user is redirected to the ReliefWeb website where the main content of the report and a link to download the PDF is presented.
Types of interactions	Synchronous/Asynchronous
Technology used	HTTP
Communication Protocol	HTTP, POP3/IMAP in order to properly receive emails from subscribed topics.
Information Formats	HTML content for the information that could be retrieved directly on the UNOCHA site (e.g. general news about disasters or similar). PDF file that are referenced on the UNOCHA site but available on the ReliefWeb site.
Type of Source	Public website. All the resources are available to all by accessing them from the internet.
References	http://www.unocha.org/about-us/publications/humanitarian-reports
Notes	All reports links redirect the user to the ReliefWeb website. These reports will provide useful additional information during the Assessment, Decision Making and Reconstruction and Recovery Phase (Situation and Bulletin reports) This information source is useful for DaLa and MIRA methodologies.

ID	IS_02
Name	WHO – Word Health Organization
Users	Humanitarian Organizations, Governmental Organizations and Non-Governmental Organizations.
Users Interactions	<ul style="list-style-type: none"> Browsing website's pages Downloading relevant reports and statistics on health in pdf format



Types of Accesses	No authentication required
Types of interactions	Synchronous
Technology used	HTML, HTTP
Communication Protocol	HTTP
Information Formats	HTML pages, PDFs and CVS
Type of Source	Public Website
References	http://www.who.int/en/
Notes	From the website it is also possible to access to Global Health Observatory data (see IS_10)

ID	IS_03
Name	GDACS
Users	Users are all the people involved in a disaster management and coordination.
Users Interactions	<ul style="list-style-type: none"> Browsing website's pages, reading information.
Types of Accesses	Part of the information has a restricted access, but a lot of information is accessible without any restriction.
Types of interactions	Synchronous/Asynchronous
Technology used	HTML/HTTP



Communication Protocol	HTTP.
Information Formats	HTML pages with maps, tables.
Type of Source	Public website with private parts.
References	http://www.gdacs.org/
Notes	

ID	IS_04
Name	ReliefWeb
Users	Humanitarian organizations, recovery and reconstruction managers can use the system as an assessment system to enable decision making and plan effective assistance.
Users Interactions	Website navigation, RSS feeds or RESTful Web Service (all content on ReliefWeb is available via APIs).
Types of interactions	Synchronous
Technology used	RESTful Web Service
Communication Protocol	HTTP
Information Formats	JSON, XML only available for feedRSS
Type of Source	Public website. All the resources are available to all by accessing them from the internet. All the APIs can be accessed with no charges and with no registration.
References	Website: http://reliefweb.int/



	API introduction: http://reliefweb.int/help/api/advanced For further details about the structure of the APIs and how they can be used please refer to D4.2 paragraph 5.3.1.5.
Notes	<p>ReliefWeb is a specialized digital service of the United Nations Office for the Coordination of Humanitarian Affairs (OCHA).</p> <p>The ReliefWeb API provides an API to allow querying and retrieval of disaster and crises updates in JSON format. Reports, analysis, documents, infographics, maps and other content can be accessed via the API for access by humanitarians to enable decision making.</p> <p>The API requests take the form:</p> <p>http://[base url]/[api version]/[content type]/[content id]?[parameter name]=[parameter value]&...</p> <p>API base url: http://api.rwlab.org/</p> <p>In order to ensure optimum performance for everyone, the API is restricted in two ways: the maximum number of entries returned per call is 1000 and the maximum number of calls allowed per day is 1000.</p> <p>An introduction of the API has been provided in D4.2 paragraph 5.3.1.5.</p> <p>This information source is useful for DaLa and MIRA methodologies.</p>

ID	IS_05
Name	Copernicus Emergency Management Service
Users	Governmental Organizations, Non-Governmental Organizations and Humanitarian Organizations.
Users Interactions	<ul style="list-style-type: none">• Browsing a map using zoom and pan controllers.• Downloading JPEG, PDF and TIFF reports.• Reporting information if user is authorized.
Types of Accesses	<ul style="list-style-type: none">• Authorized Users.• Associated Users.• General Public Users.
Types of interactions	Synchronous/Asynchronous



Technology used	HTML, HTTP
Communication Protocol	HTTP
Information Formats	HTML pages, PDFs, JPEGs, TIFFs and KMLs
Type of Source	Public Website
References	http://emergency.copernicus.eu/mapping
Notes	3 types of users, All people can consult, but only authorized Users can upload information.

ID	IS_06
Name	CODs (Common Operational Dataset)
Users	Governmental Organizations, Non-Governmental Organizations and Humanitarian Organizations.
Users Interactions	<ul style="list-style-type: none"> Browsing the specific desired location data Downloading or directly view it on website.
Types of Accesses	<ul style="list-style-type: none"> Authorized Users. Associated Users. General Public Users.
Types of interactions	Synchronous
Technology used	HTML, HTTP
Communication Protocol	HTTP
Information Formats	Geographic Dataset: <ul style="list-style-type: none"> Geonode WPF (http://geonode.wfp.org)



	<ul style="list-style-type: none"> • CSV or XLS • SHP (ESRI vector maps) and KML/KMZ
Type of Source	Public Website
References	http://www.humanitarianresponse.info/applications/data
Notes	They are critical datasets that are used to support the work of humanitarian actors across multiple sectors. Not all Nations are available

ID	IS_07
Name	REDHUM - Red de Información Humanitaria para América Latina y el Caribe
Users	Humanitarian Organizations, Governmental Organizations and Non-Governmental Organizations.
Users Interactions	<ul style="list-style-type: none"> • Browsing website's pages and reading news • Downloading maps, report and document related to disasters occurred in Latin America • Subscription to newsletters and sms alert systems
Types of Accesses	Access processes required to subscribe to newsletter and sms alert system
Types of interactions	Synchronous/Asynchronous
Technology used	HTML, HTTP
Communication Protocol	HTTP, POP3/IMAP
Information Formats	HTML pages, PDFs, sms and e-mails
Type of Source	Public Website



References	http://www.redhum.org
Notes	Only Spanish language is available

ID	IS_08
Name	UNICEF
Users	Users are all the people interested by the children situation, after a disaster for DESTRIERO scenario.
Users Interactions	Browsing website's pages and reading documents or viewing videos
Types of Accesses	Not restricted access.
Types of interactions	Asynchronous.
Technology used	HTML, HTTP
Communication Protocol	HTTP
Information Formats	HTML pages with tables, statistics
Type of Source	Public website
References	http://www.unicef.org/
Notes	

ID	IS_09
Name	UN Data API
Users	-



Users Interactions	<ul style="list-style-type: none"> Keywords searching Database Exploration Advanced Searching
Types of Accesses	No authentication required
Types of interactions	Synchronous/Asynchronous
Technology used	HTML, HTTP, RESTful web
Communication Protocol	HTTP
Information Formats	JSON, SDMX, XML, HTML
Type of Source	N/A
References	http://data.un.org/
Notes	Web HMI or WebServices for QUERIES.

ID	IS_10
Name	Global Health Observatory
Users	All the organizations involved during the recovery and reconstruction phases.
Users Interactions	<p>The easiest way to interact is to connect to the World Health Organization website and extract from there the contents.</p> <p>Furthermore, the WHO provides the Athena web service to allow simple queries to the World Health Organization's data and statistics content.</p>
Types of interactions	Synchronous/Asynchronous
Technology	RESTful Web Service



used	
Communication Protocol	HTTP
Information Formats	Spreadsheet ML, CSV, JSON, HTML, XML There are appropriate parameters that can be provided into the API requests, which format the answer as desired.
Type of Source	Public website. All the resources are available to all by accessing them from the internet. All the APIs can be accessed with no charges and with no registration.
References	Website: http://www.who.int/gho/en/ Data Query API: http://apps.who.int/gho/data/node.resources.api
Notes	The GHO data repository contains an extensive list of indicators, which can be selected by theme or through a multi-dimension query functionality. It is the World Health Organization's main health statistics repository. The statistics should provide some supplementary data to the information and data requirements in the Baseline phase of the PDNA process. An introduction of the API has been provided in D4.2 paragraph 5.3.1.9. This information source is useful for MIRA methodology. API URL format: http://HOST[:PORT]/PATH/athena/INSTANCE/[DIMENSION[/CODE[,CODE2[,CODEn]]].EXTENSION][?QUERY_PARAMETERS]] API examples: http://apps.who.int/gho/athena/public_docs/examples.html

ID	IS_11
Name	3W (Who What Where)
Users	All the organizations involved during the recovery and reconstruction phases.
Users	The easiest way to interact is to connect to the 3W website and extract



Interactions	from there the contents.
Types of Accesses	<ul style="list-style-type: none"> • Authorized Users. • General Public Users.
Types of interactions	Synchronous
Technology used	HTML, HTTP
Communication Protocol	HTTP
Information Formats	HTML
Type of Source	Public website. All the resources are available to all by accessing them from the internet.
References	http://3w.unocha.org/WhoWhatWhere/
Notes	There is also a Tool (http://www.humanitarianresponse.info/applications/tools/category/3w-who-does-what-where) that should allow easy access to information.

ID	IS_12
Name	OpenWeatherMap API
Users	-
Users Interactions	RESTful Web Service
Types of Accesses	<p>To get access to weather API, an API key is required. There is different type of account from Free to Enterprise. The Free account (\$0/month) has the following restrictions:</p> <ul style="list-style-type: none"> • 3000 API calls per minute • Full weather data range • History data < 1 month



	<ul style="list-style-type: none">• Data Update < 2 hours• No SSL
Types of interactions	Synchronous
Technology used	RESTful Web Service
Communication Protocol	HTTP
Information Formats	JSON, XML, HTML and OGC WMS (for map layers like clouds coverage, temperature etc.)
Type of Source	N/A
References	http://openweathermap.org/
Notes	-

ID	IS_13
Name	IRIN News
Users	Users are people interested by humanitarian information.
Users Interactions	Browsing website's pages and reading documents or viewing videos
Types of Accesses	Not restricted access.
Types of interactions	Asynchronous.
Technology used	HTML, HTTP
Communication Protocol	HTTP



Information Formats	HTML pages, videos, tweets
Type of Source	Public Website
References	http://www.irinnews.org/
Notes	

ID	IS_14
Name	UNOSAT
Users	<ul style="list-style-type: none"> • UN offices and agencies • Government agencies • Red Cross and Red Crescent Movement (ICRC and IFRC) • International and regional organizations • Humanitarian Non-Governmental Organizations (NGOs)
Users Interactions	<ul style="list-style-type: none"> • Browsing website's pages • Downloading reports in pdf format • Submitting requests
Types of Accesses	No authentication required for consulting information.
Types of interactions	Synchronous/Asynchronous
Technology used	HTML, HTTP
Communication Protocol	HTTP
Information Formats	Georeferenced files (Shapefile ESRI), PDFs, HTML pages
Type of Source	Public Website
References	http://www.unitar.org/unosat/



Notes	UNOSAT will request satellite imagery programming for area of interest and provides relevant digital information.
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ID	IS_15
Name	AID Worker Security
Users	Humanitarian Non-Governmental Organizations (NGOs)
Users Interactions	Access to Database information through website making a query
Types of Accesses	Not restricted access.
Types of interactions	Synchronous.
Technology used	HTML, HTTP
Communication Protocol	HTTP
Information Formats	HTML
Type of Source	Public Website
References	https://aidworkersecurity.org/incidents
Notes	It provides Incidents of violence against aid workers with incident reports.

ID	IS_16
Name	FODS - Fundamental Operational Datasets
Users	Humanitarian Organizations, Governmental Organizations and Non-Governmental Organizations.



Users Interactions	<ul style="list-style-type: none"> Searching data in the repository filtering by category, location and data type. Downloading data clicking on a button
Types of Accesses	No mandatory authentication
Types of interactions	Synchronous
Technology used	HTTP, HTML
Communication Protocol	HTTP
Information Formats	Several formats: XLSX, XLS, ESRI Shapefile
Type of Source	Public Website
References	https://www.humanitarianresponse.info/applications/data/datasets
Notes	Some entries in the repository could contain links to information provided by other information sources described in this document (UNOSAT etc.)

ID	IS_17
Name	VOSOCC Discussion Feeds
Users	<p>Main users are disaster managers who need to access to this real-time coordination platform.</p> <p>Other users are people involved in disaster management.</p>
Users Interactions	<p>For all users: browsing website's pages, reading and downloading documents.</p> <p>Disaster managers can also provide information.</p>
Types of Accesses	<p>Public access to published information.</p> <p>Restricted access for publishers.</p>



Types of interactions	Synchronous.
Technology used	HTML, HTTP
Communication Protocol	HTTP
Information Formats	HTML pages, documents with various formats (pdf, word, excel...)
Type of Source	Public website
References	http://vosocc.unocha.org/
Notes	

ID	IS_18
Name	People in Aid
Users	Humanitarian Organizations, Governmental Organizations and Non-Governmental Organizations.
Users Interactions	<ul style="list-style-type: none"> • Browsing website's pages • Download and view reports
Types of Accesses	Authentication required
Types of interactions	Synchronous/Asynchronous
Technology used	HTML, HTTP
Communication Protocol	HTTP
Information	HTML pages and PDFs



Formats	
Type of Source	Private software and private Website
References	http://www.peopleinaid.org/
Notes	People In Aid improves organizational effectiveness within the humanitarian and development sector worldwide by promoting, supporting and recognizing good practice in the management of people.

ID	IS_19
Name	HAP Website
Users	Humanitarian Organizations, Governmental Organizations and Non-Governmental Organizations.
Users Interactions	Browsing website's pages Download and view reports
Types of Accesses	Authentication required
Types of interactions	Synchronous
Technology used	HTML, HTTP
Communication Protocol	HTTP
Information Formats	HTML pages and PDFs
Type of Source	Private software and private Website
References	http://www.hapinternational.org/
Notes	



ID	IS_20
Name	ECLAC
Users	<p>Any user who needs reports and studies on consequences of natural disasters, publications on disaster recovery, Handbooks for Estimating the Socio-Economic and Environmental Effects of Disasters and news regarding Latin America and the Caribbean.</p> <p>The availability of timely statistical information is essential for socio-economic and environmental analysis and for various decision-making processes.</p>
Users Interactions	Email updates subscription, RSS Feeds, CEPALSTAT Web Service
Types of interactions	Synchronous/Asynchronous
Technology used	RESTful Web Service
Communication Protocol	HTTP
Information Formats	XML
Type of Source	<p>Public website. All the resources are available to all by accessing them from the internet.</p> <p>All the APIs can be accessed with no charges but with the necessity of a registration. We have tested the registration process, but a 500 Internal Sever Error is returned so, finally, the access to the API is not yet possible at the time of writing of this deliverable.</p>
References	<p>Website: http://www.eclac.cl/</p> <p>CEPALSTAT API:</p> <p>http://estadisticas.cepal.org/cepalstat/WEB_CEPALSTAT/openDataAPI.asp?idioma=i</p> <p>CEPALSTAT API Query builder:</p> <p>http://estadisticas.cepal.org/cepalstat/WEB_CEPALSTAT/QueryBuilder/In</p>



	dicatorQueryBuilder.html
Notes	To use the API CEPALSTAT a registration as application developer is needed (registered domain name has to be provided to submit the registration form).

ID	IS_21
Name	GFDRR – Global Facility for Disaster Reduction and Recovery
Users	Humanitarian Organizations, Governmental Organizations and Non-Governmental Organizations.
Users Interactions	<ul style="list-style-type: none">• Browsing website's pages• Searching in repository of reports• Downloading relevant reports in pdf format
Types of Accesses	No authentication required
Types of interactions	Synchronous
Technology used	HTTP, HTML
Communication Protocol	HTTP
Information Formats	HTML, PDF
Type of Source	Public Website
References	https://www.gfdr.org/
Notes	-

ID	IS_22
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Name	AIDMI
Users	Users are people interested in risk reduction for the poor.
Users Interactions	Browsing website's pages, reading and downloading documents.
Types of Accesses	Not restricted access.
Types of interactions	Asynchronous.
Technology used	HTML, HTTP
Communication Protocol	HTTP
Information Formats	HTML pages, pdf
Type of Source	Public Website
References	http://www.aidmi.org
Notes	

2.1.4.3 Data Sources

2.1.4.3.1 Data Sources

ID	SENS_01
Name	Gamma Camera (Example is here provided for the Toshiba Portable Gamma Camera because of the poor information available for this kind of tools)
Users	Health Physics (HP) technicians use it.
Users Interactions	A camera might have one, two or occasionally three heads, with one or more being used to obtain the images. Each camera head has a flat



	<p>surface that has to be very close to the patient. The camera heads might be supported in a number of different ways using strong metal arms or a gantry. There are no unusual sensations associated with having images taken with a gamma camera and the machine makes no noise.</p> <p>The Gamma Camera is really useful, in case of CBRN crisis, to understand if people, that were in the damaged area at the time of occurrence of the disaster, have been contaminated or not.</p>
Types of Accesses	This is a mechanic machine, so there are no constraints related to the type of accesses that can be done.
Types of interactions	N/A
Technology used	<p>In the case of the <i>Portable Gamma Camera</i>, produced by Toshiba, specification are detailed as follows:</p> <p>The camera measures 380 x 110 x 241mm and weighs 9.8kg. It is equipped with 128 semiconductor detection elements as radiation sensors. Its view angle is 60°. It can be powered by either an AC100V power source or batteries. When it is powered by batteries, it can be operated for three hours.</p>
Communication Protocol	No film, disc or SD-card is used to record the composite images, which are instead transmitted to a designated computer, laptop, tablet or other such display. There are no information about the kind of protocol that is used and there is no possibility to try the software used to process the data.
Information Formats	N/A
Type of Source	The tool is proprietary of Toshiba.
References	http://inventorspot.com/articles/toshibas_portable_gamma_camera_takes_snapshots_radiation_hotspot
Notes	

ID	SENS_02
Name	Colibri



Users	Health Physics (HP) technicians use it.
Users Interactions	<p>The “always on” gamma dose feature ensures the worker is always informed – even when using the Colibri for contamination surveys with attached probes. The Colibri also allows for wireless data collection from pre-positioned detectors that can be placed in radiation areas – eliminating the need to attach probes, VLD (is a product of the Colibri gamma) get close to the source – then manually transcribe data. Walk into the room – and Colibri performs the survey for you – allowing exit from the radiated area in a fraction of the normal time.</p> <p>It can be worn on the belt with a permanent smooth clip, or held comfortably in the hand using the finger strap and secure wrist strap.</p> <p>The Colibri’s speaker emits alarm sounds as well as other audible signals. In the event of a radiation hazard, regardless of working conditions, an alarm will sound along with a flashing LED and vibrator. The standard available off the shelf Bluetooth headset will better support source and contamination location in noisy environments.</p>
Types of Accesses	Colibri can be set to any level between fully open and highly restricted for a dedicated worker or a group of users. Colibri includes user and profile management to adapt the instrument to worker capabilities depending on his primary task. The log-in function can be enabled to bring an additional level of traceability since each measurement stored is then linked to a specific user name or group of users. Colibri data and parameters are password protected.
Types of interactions	Data is acquired asynchronously. It can save a large number of measurements associated with location data, such as GPS coordinates, barcode, RFID tag or simply an incremental index. GPS is a Colibri internal option while Barcode or RFID readers connect via Bluetooth link.
Technology used	Bluetooth and Wireless connectivity.
Communication Protocol	Colibri connects to a PC using a standard web browser for data transfer and instrument setup. Connection can be wired with the USB Colibri cable (part of standard delivery) or wireless with internal Bluetooth link if the user computer is Bluetooth capable.
Information Formats	Colibri manages three date stamped CSV files (MS- EXCEL compatible) for each day of operation:



	<ol style="list-style-type: none"> 1. Automatic and transparent storage of dose-rate every five seconds. 2. Manually triggered data-logging with internal detector and/or external probes. 3. Automatic data-logging. <p>This selection facilitates data retrieval because the user only needs to identify the day of interest</p>
Type of Source	The tool is proprietary of Canberra Corporation.
References	http://www.canberra.com/products/hp_radioprotection/pdf/Colibri-VLD_C39518.pdf
Notes	All the extracted information has been taken from the Colibri datasheet.

ID	SENS_03
Name	Falcon 5000
Users	Health Physics (HP) technicians use it.
Users Interactions	<p>The Falcon 5000 is a highly powerful and customizable field spectroscopy system. The system comes complete with a full version of CANBERRA's industry leading gamma analysis software, Genie 2000. The full power of Genie 2000 analysis is available in the Falcon 5000; however, a simple "push button" user interface allows easy navigation through the instruments' basic control functions. The measurement can be stopped, started and saved at any time. Available user modes are: Dose, Locate, Spectrum and NID. All modes are available from the main screen. Once the Falcon 5000 has been configured, the user simply starts the measurement, uses the Locate function to find the increased radiation field, and then looks at the NID page for the results. The spectrum can be viewed at any time to determine if the NID results match the collected spectrum for consistency.</p> <p>The control unit/user interface is implemented on a Tablet PC running Windows® XP operating system. This platform enables the user to easily collect and analyse spectra, calibrate the detector, and customize the MCA for special applications.</p>
Types of	N.a.



Accesses	
Types of interactions	N.a.
Technology used	Wireless or rj-45 Ethernet cable
Communication Protocol	N.a.
Information Formats	Genie 2000 software suite allows for the flexible formatting of output data to meet the unique requirements of the application. Report format is controlled by a virtual report engine which contains a set of commands that format the report output. The report flexibility gives the user the ability to output data in a form that can be imported into other packages such as databases and spreadsheets. By defining the report template to produce an ASCII delimited file in a format consistent with the input requirements of other packages, data can easily be exchanged. Reports are always directed to a data file and optionally to the screen and/or a printer. A report can also be exported to PDF format.
Type of Source	The tool is proprietary of Canberra Corporation.
References	http://www.canberra.com/products/hp_radioprotection/falcon-5000.asp http://www.canberra.com/products/hp_radioprotection/pdf/Falcon-SS-C38597.pdf
Notes	All the extracted information has been taken from the Falcon 5000 datasheet.

ID	SENS_04
Name	Generic Camera
Users	Organization's team on the field can use this kind of sensors to acquire real-time images of the damaged area. This category can be divided in three sub-categories: <ol style="list-style-type: none">1. Portable Cameras,2. Handheld Cameras,



	<p>3. Infrared Cameras.</p> <p>The detailed studies here conducted refer to a category of products that have been analysed such as: GoPro Hero 4, Sony Action Cam, DraganFly X4-C.</p>
Users Interactions	The camera is attached on the Helmet or on a UAV.
Types of Accesses	Password protection, IP address filtering, HTTPS encryption, IEEE 802.1X network, access control, Digest authentication, User access log.
Types of interactions	Wireless technology for data transfers
Technology used	High Secure Digital (SD) for storage capacity, High Definition (HD) quality, Full HD 1080/60i/60p/24p, mini-AB/USB2.0 Hi-speed (mass-storage/Media Transfer Protocol (MTP).
Communication Protocol	HTTPS, RTP/RTSP (codec H264 for robust codifications with low bandwidth)
Information Formats	<p>Videos are recorded in the following file format:</p> <ul style="list-style-type: none"> • MPEG-4, • AVI, • MOV, • XAVC S (file format introduced by Sony and proprietary of Sony Corporation). <p>UAV records are realized in the same format above specified.</p>
Type of Source	All the data here defined has been searched through the internet.
References	<p>http://it.shop.gopro.com/EMEA/cameras/hero4-black/CHDHX-401.html#/q=hero+4&simplesearch=Go&start=1</p> <p>http://www.draganfly.com/uav-helicopter/draganflyer-x4c/specifications/x4c_camera_payloads_v5.pdf</p> <p>http://www.draganfly.com/uav-helicopter/draganflyer-x4c/specifications/</p> <p>http://www.sony.it/electronics/actioncam/fdr-x1000v-body-kit</p>
Notes	As suggested in D3.1, these cameras must be compliant with IP and NEMA standards (for temperature, humidity, dust, etc.).



ID	SENS_05
Name	Global Positioning System (GPS) In the scope of the DESTRIERO system we refer to the GPS antenna and receivers systems.
Users	The main objective of a GPS system is to identify in a specific location of an entity. In our scope, it is necessary to track: <ul style="list-style-type: none"> • Infrastructures, • Vehicles, • Human on the field.
Users Interactions	Users can analyse collected data through the DESTRIERO platform with no need to interact directly with the GPS antenna and receiver. Data are sent through a web service or an SMS receiver that will process them and share among the DESTRIERO nodes.
Types of Accesses	There is no restricted access to the GPS antenna data.
Types of interactions	Synchronous
Technology used	Serial Transmissions. SMS or GPRS for sending data to a specific platform (GPS Tracker works with SIM Cards that must be installed into the device).
Communication Protocol	GPS Modules can be queried through the serial protocol. Here the details of the communication protocol for the TRANSYSTEM: NMEA-0183 (V3.01) - GGA, GSA, GSV, RMC (default). Data bit: 8, stop bit:1 (Default).
Information Formats	A GPS antenna system usually produces NMEA messages whose example is reported below: <ul style="list-style-type: none"> • <i>\$GPRMC,235316.000,A,4003.9040,N,10512.5792,W,0.09,144.75,141112,,*19</i> • <i>\$GPGGA,235317.000,4003.9039,N,10512.5793,W,1,08,1.6,1577.9,M,-20.7,M,,0000*5F</i> • <i>\$GPGSA,A,3,22,18,21,06,03,09,24,15,,,,,2.5,1.6,1.9*3E</i> For example, the GPGGA sentence contains the follow:



	<ul style="list-style-type: none"> - <i>Time</i>: 235317.000 is 23:53 and 17.000 seconds in Greenwich mean time - <i>Longitude</i>: 4003.9040,N is latitude in degrees.decimal minutes, north - <i>Latitude</i>: 10512.5792,W is longitude in degrees.decimal minutes, west - <i>Number of satellites seen</i>: 08 - <i>Altitude</i>: 1577 meters
Type of Source	All the data here defined has been searched through the internet.
References	https://learn.sparkfun.com/tutorials/gps-basics http://www.esseshop.it/transystem-747pros-gps-data-logger-747-pros-canali-p-9352.html
Notes	

ID	SENS_06
Name	Extensometer GeoNet Wireless Network (Model 8800 Series) + Single Point, Rod, Mechanical (Model 1050 A-1)
Users	<p>GeoNet is a low power data acquisition network developed to more efficiently collect data from widely distributed instruments where cabling and cable trenching is difficult and time consuming (or not possible). Typical applications include:</p> <ul style="list-style-type: none"> • Groundwater monitoring • Dams • Structural monitoring of buildings, bridges, excavations and tunnels • Historical structures • Mining
Users Interactions	The user needs to install the extensometers on the target structural element, setup and configure the GeoNet wireless network and analyse the collected data. Configuration of the network and collection of data is accomplished via a PC client program by connecting to the network supervisor directly, through cellular modems or network serial servers.



Types of Accesses	N.A.
Types of interactions	Asynchronous (Sensor reading are synchronized across the entire network with thirteen sample intervals between 10 minutes and 24hours)
Technology used	N.A.
Communication Protocol	GeoNet is built on top of the IEEE 802.15.4 standard. Data is aggregated and accessible at the network supervisor node via Modbus RTU either with RS-232, RS-485 or USB (as a virtual COM port) physical connections. A copy of all data, collected and sent to the supervisor, is stored on each respective node.
Information Formats	Once collected by the configuration software, the data can be exported as comma delineated ASCII text suitable for import to other data analysis programs. Each data array consists of the record time with one second resolution, node temperature, battery voltage, sensor temperature, array number and vibrating wire sensor reading.
Type of Source	N.A.
References	http://www.geokon.com/content/datasheets/8800_Series_GeoNet_Wireless_Network.pdf
Notes	All the extracted information has been taken at the link provided in the References field.

ID	SENS_07
Name	Inclinometer
Users	Applied on the field in order to monitor movements for: <ul style="list-style-type: none"> - An infrastructure, - A terrain.
Users Interactions	Users can analyse collected data through the DESTRIERO platform with no need to interact directly with the inclinometer. Data are sent through a web service or an SMS receiver that will process them and share among the DESTRIERO nodes.



Types of Accesses	Information retrieved by email or SMS
Types of interactions	Synchronous
Technology used	SMS or GPRS for sending data to a specific platform.
Communication Protocol	N.A.
Information Formats	N.A.
Type of Source	All the data here defined has been searched through the internet.
References	<p>http://www.oyo.co.jp/english/products_list/stationary-borehole-inclination-measurement-stationary-inclinometer/</p> <p>An example is the Stationary Inclinometer & GSM i-SENSOR produced by the OYO Corporation. Stationary Inclinometer system consists of the probe "Stationary Inclinometer (Model-4488)" to measure inclination and data logger and transmission unit "GSM i-SENSOR 4.1ch for Stationary Inclinometer (Model-4773)" to read / storage the monitoring data and to send the data to dedicated server. This is a remote monitoring system with intelligence functions that user can set a certain threshold for early warning sent by e-mail/SMS and for automatic change of monitoring interval, and some settings can be remotely changed at a distant place such as an office via GSM/GPRS. Stationary Inclinometer is a measuring probe with high accuracy digital output type, and inclination from vertical is measured. Incline-sensor applies MEMS to enhance measurement accuracy, stability and low power consumption</p>
Notes	

[SEN_08] and [SEN_09] have not been detailed due to the poor descriptions provided. This because the SAR and Optical Images data evaluation is already provided through the WebGIS 3rd party system that will be completely integrated into the DESTRIERO platform.

2.1.4.3.2 Audio-Video:

ID	AV_01
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Name	Podcast
Users	NGO, GO that use the DESTRIERO platform and are interested in podcast that talk about the crisis-management operations.
Users Interactions	It depends, there are a lot of online free services that enable users to access podcast (e.g. iTunes podcast). It is supposed that the integration in DESTRIERO will enable users to access to a specific section of the platform that let listen to the selected podcast.
Types of Accesses	The access could be restricted or not.
Types of interactions	Asynchronous/Synchronous
Technology used	RESTFul API or WebServices
Communication Protocol	FTP, HTTP/HTTPS
Information Formats	Podcasts can be in the M4A, MP3, MOV, MP4, M4V, PDF, and EPUB file formats. When a podcast is published an RSS feed (XML format) is generated. This RSS is compliant to the RSS 2.0 specification, includes recommended RSS tags and contains a pointer to the podcast resource.
Type of Source	All the data here defined has been searched through the internet.
References	https://www.apple.com/itunes/podcasts/specs.html
Notes	

ID	AV_02
Name	YouTube
Users	NGO, GO that use the DESTRIERO platform and are interested in video evaluations for the damaged area.
Users Interactions	YouTube video could be seen directly on the provider's site. It could be supposed integration into the DESTRIERO platform by



	enabling an appropriate section that enables users to see uploaded videos.
Types of Accesses	The YouTube services can be accessed with or without the need of an authentication process. The use of the API requires an account login process.
Types of interactions	Synchronous/Asynchronous
Technology used	In conjunction with the YouTube Player APIs and the YouTube Analytics API, the API lets your application provide a full-fledged YouTube experience that includes search and discovery, content creation, video playback, account management, and viewer statistics.
Communication Protocol	HTTP/HTTPS
Information Formats	The entire APIs use for answers the JSON format.
Type of Source	All the SDKs can be downloaded freely directly from the YouTube site.
References	https://developers.google.com/youtube/v3/?hl=en (http://youtube.it)
Notes	

2.1.4.3.3 Social Media:

ID	SM_01
Name	Facebook
Users	NGO, GO that use the DESTRIERO platform and are interested in understanding the current damage situation for the affected area analysing data coming from socials.
Users Interactions	All the Facebook data is accessible through an appropriate web site. It could be supposed integration into the DESTRIERO platform by enabling an appropriate section that enables users to query Facebook



	data.
Types of Accesses	The Facebook services can be accessed with or without the need of an authentication process. The use of the API requires an account login process.
Types of interactions	Synchronous/Asynchronous
Technology used	RESTFul services
Communication Protocol	HTTP/HTTPS
Information Formats	The entire APIs use for answers the JSON format.
Type of Source	All the SDKs can be downloaded freely directly from the Facebook Developer site.
References	https://developers.facebook.com/docs/apis-and-sdks
Notes	

ID	SM_02
Name	Twitter
Users	NGO, GO that use the DESTRIERO platform and are interested the information dissemination through Twitter.
Users Interactions	All the Twitter data is accessible through an appropriate web site. It could be supposed integration into the DESTRIERO platform by enabling an appropriate section that enables users to query Twitter data.
Types of Accesses	The use of the API requires an account login process.
Types of interactions	Synchronous/Asynchronous



Technology used	RESTFul services
Communication Protocol	HTTP/HTTPS
Information Formats	The entire APIs use for answers the JSON format.
Type of Source	All the SDKs can be downloaded freely directly from the Twitter Developer site.
References	https://dev.twitter.com/rest/public
Notes	



3 DEMONSTRATION SCENARIO IDENTIFICATION

Based on demonstration scenario interactions requirements and available partner's tools, a subset of all identified D4.1 sources and tools have been identified. In order to discover these sources and systems three steps have been performed:

- Step 1: description of a possible demonstration scenario that takes into account formalized user requirements defined in D2.1, the scenario description with its vignettes [D2.2], third party systems and information sources to be agreed with end-users that allow the validation of the DESTRIERO platform.
- Step 2: creation of detailed interactions sequences based on §3.1 detailed scenario description.
- Step 3: selection of information sources and third party systems to be integrated within DESTRIERO.

3.1 *Demonstration Scenario Overview*

A demonstration scenario has been defined based on all Information Sources detailed in chapter 2, trying to identify a good subset of interactions that can completely validate the DESTRIERO infrastructure. This subset will be used in order to identify which adapters have to be designed and developed.

3.1.1 DESTRIERO Scenario Summary

The described scenario will be considered in three different time frames:

- The first one goes from T0 to T0+96 hours. In this time frame, three events happen [D2.2] and the rescue teams are deployed in the area for mitigating the effects and help the victims. This timeframe is mainly dedicated to crisis management and victims rescuing and it is out of scope of DESTRIERO,
- The second time frame starts from T0+96 hours and it is when DESTRIERO system begins to receive data from the field for initiating the damage assessment,
- The third timeframe starts approximately T0+2 weeks (depending on the country/area affected) and it is when the recovery and reconstruction phases will start by using the information gathered by DESTRIERO system during the second timeframe.

In many places within Europe it can be found the described configuration of the infrastructures involved in this scenario. From the [D2.2], the selected place is the border of four Spanish regions (Madrid, Toledo, Cuenca and Guadalajara). A satellite view of the area can be seen in Figure 1 showing the critical locations and infrastructures involved in the cascade incident.



Figure 1 – Scenario area view

In this area, as can be seen in Figure 1, we can find the Entrepeñas dam (See number 1 in Figure 1), which is one of the biggest dams of Europe. Some kilometres to the south from Entrepeñas dam there is the Bolarque dam (See number 2 in Figure 1) and some kilometres beyond this second dam it can be found the José Cabrera nuclear plant (See number 3 in Figure 1).

A more detailed view of the Entrepeñas dam and the huge amount of water that it regulates can be seen in Figure 2.



Figure 2 – Entrepeñas dam detail

In Figure 3 a detailed view of the Bolarque dam can be seen between the course of the Guadiela River and the Tajo River.



Figure 3 – Bolarque dam detail

In Figure 4 there is depicted a detailed view of the José Cabrera nuclear plant (3), which can be seen just in the Tajo river shore.



Figure 4 – José Cabrera nuclear plant detail

Once the infrastructures configuration in the area has been defined, the development of the cascading events that compose the configuration of the final DESTRIERO scenario is described in the following paragraphs.

T0

A big earthquake happens with its epicentre located a few kilometres in the south of Entrepeñas dam (Figure 5). This big earthquake causes severe damages in the surrounding cities and small towns and provokes the collapse of the Entrepeñas dam.

T0+30 minutes

A large flood caused by the Entrepeñas dam arrives at the Bolarque dam, this has not been collapsed, but it is seriously damaged. The high pressure of the water causes the Bolarque dam to collapse and simply as a domino effect another big flood goes through the Tajo River (Figure 5).

T0+50 minutes

The big flood following the Tajo River reaches to the José Cabrera nuclear plant (Figure 5) that was partially affected by the previous earthquake and brings a large devastation in the area that causes a black out affecting the cooling system of the plant and also affecting one of the reactors' infrastructures.

T0+90 minutes



A radioactive leakage is produced due to the composite damages provoked by the earthquake, the flood and the lack of cooling system and power in the nuclear plant. The whole situation can be seen in Figure 5.

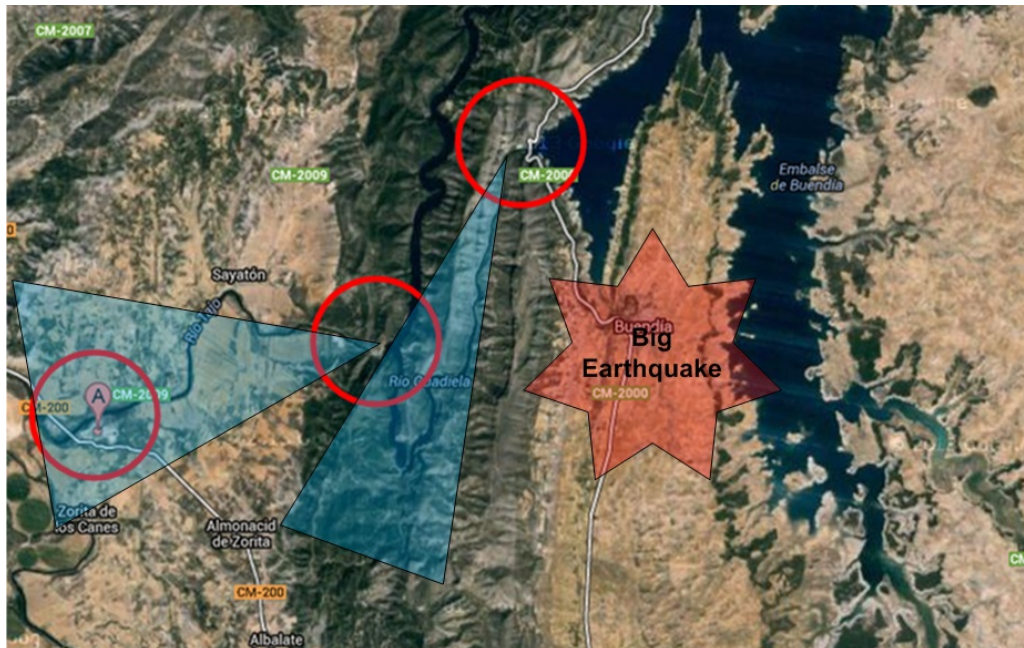


Figure 5 – Events location and Cascade effect description

The crisis is managed during the following 72 hours and it involves all emergency services in Spain, the Spanish Army and other agencies from France and Portugal also participate in the victims rescuing process. For demonstration purpose we will suppose that the T0 corresponds to the following date: 07/12/2015 at 8:00 a.m.

3.1.2 T0 + 72 (hours) – Data gathering and platform initial setup

The organizations using the DESTRIERO platform start the set up processes in order to let the system be operative as soon as possible. Three different organizations have already accomplished the organization's registration process into the DESTRIERO platform by inserting the generalities that characterize the organization and the data concerning the accounts for their operators that will practically use the DESTRIERO platform. In particular, Table 2, summarizes the organizations and the accounts that have been created:

Organization	Division	Operator Name	Operator Role
Spanish Ministry of Interior	-	Jorge Fernández Díaz	Spanish Ministry of Interior
Spanish Ministry of	Spanish National	Pepe Pérez	Police Officer



Interior	Police		
Spanish Ministry of Interior	General Direction of the Spanish National Police and Civil Guard	Carlos Rodriguez	Decision Maker
Spanish Ministry of Defence	Spanish Army	Fernando García	Chief of the Army Staff
Italian Ministry of Interior	Italian Civil Protection (Management of Emergencies)	Mario Rossi	Chief of the Resources Management in emergency states section
Sayatón City	Sayatón Administrative	José Francisco Costa	Major of Sayatón
Reconstruction Company1	Infrastructure Reconstruction Section	Amós Salvador Carreras	Chief of the Infrastructure Reconstruction Section
Reconstruction Company2	Infrastructure Reconstruction Section	Blas Pérez González	Chief of the Infrastructure Reconstruction Section
Reconstruction Company3	Infrastructure Reconstruction Section	José Maria Callejon	Chief of the Infrastructure Reconstruction Section

Table 2 - Organizations and Actors' Roles within the DESTRIERO platform

One account is registered into the DESTRIERO Platform for each of the six organizations. At this stage, we suppose that the DESTRIERO nodes are running so that they can accept third party systems/information sources registration. In particular, each of the third party system and information source starts its registration process to the DESTRIERO node. The registration will be characterised by:

- A role (e.g. decision-support-system, messaging-system etc.),
- The services that the third party system/information source offers.



Once the system is correctly set up and running the data starts to be acquired in a continuous way.

If available, CODs (Common Operational Datasets) are gathered for the affected area and displayed on the DESTRIERO HMI. During the crisis management CODs could be updated, and so, in this case, they will be updated consequently by directly invoking the UNOCHA site. In particular, information about the objects present in the affected area is gathered:

- Administrative Boundaries,
- Populated Places,
- Transportation Network,
- Hydrology
- Hypsography,
- Population Statistics,
- Humanitarian Profile

All this information could help the DESTRIERO system to have a common dataset for the country in which the disaster has occurred that can be used to add value for the decision support tools outputs. Furthermore, If UNOCHA CODs are unavailable, the system will gather same data from the WHO website. In particular, the WHO website (<http://www.who.int/en/>), under the section Data, sub-section Country Statistics, country selected Spain, presents information related to:

1. Country summary of statics,
2. Health statistics summarized for major health topics,

The information (1) could be integrated in two different ways:

- A. By downloading the dataset producing an xls from which data can be extracted,
- B. Embedding the generated table with an URL in an HTML page.

For the information in point (2) a pdf is available for the download and, moreover, information about health systems and essential health technologies can be retrieved always by downloading a pdf file. This information retrieval provides necessary data for a common operational dataset to be available within the DESTRIERO platform that can be used for decision support operations in next steps and so, basically, for each of the information that is gathered and processed by the platform, the DESTRIERO infrastructure will persist at least a "name", a "type" and a "location".

UNOCHA RELIEFWeb is queried to retrieve timely humanitarian information on global crises and disasters. If required, this information can be accessed from the DESTRIERO HMI or other connected systems.

WebGIS is architected to live query COPERNICUS, UNOSAT and GDACS information sources for the retrieval of map objects. This capability enhances the possibility for the DESTRIERO end-user to access to up-to-date imagery for the affected area.

The Spanish National Police Officer, involved in the assessment of the disaster area, creates



two contact groups using the DESTRIERO HMI to better manage the operations with the two police teams deployed on the area:

- POLICIA-GROUP1,
- POLICIA-GROUP2.

For each created group, the officer, through a specific section of the HMI, provides a set of contacts' mobile phone numbers. A user, responsible for the communications with the created groups, is preconfigured to send/receive SMS text messages useful for alert notifications; similarly a contact number will be preconfigured within B2M to allow relief workers to reply to the messages sent by those responsible.

The Spanish Ministry of Interior assigns to the Spanish Army forces authorizations for helping during the recovery and reconstruction activities. The Chief of the Army Staff decides to configure and to use, for the crisis management operations, the DESTRIERO platform. So he proceeds by creating two force teams to be deployed on the field (hereinafter called MILITARY-FORCE-GROUP1, MILITARY-FORCE-GROUP2). Two groups are then created through the DESTRIERO HMI and responsible persons, belonging to the groups, are added:

- MILITARY-FORCE-GROUP1,
- MILITARY-FORCE-GROUP2,

There will be a preconfigured appropriate phone number to which military groups can reply, in case of SMS text messages. All the messages to this group will be sent out on this number. Moreover, the Chief of the Army Staff decides to upload, through an appropriate section of the HMI, a file containing an initial CBRN contamination assessment of the area that contour the Jose Cabrera Nuclear Plant that has been provided previously the T0+72h by one of the army groups. This information is stored into the platform and is available for future uses and evaluations.

The Italian Civil Protection, section Management of Emergency, due to the Spanish necessity to have help in managing the crisis, decides to support crisis management operations by providing two operational teams that can be displayed on the field. The Chief of the Resources Management decides to manage Italian Civil Protection groups with the use of the DESTRIERO platform and so the first operation he accomplishes is the creation of the groups to be managed through the DESTRIERO platform for communication purposes. Two groups are created:

- ICIVIL-GROUP1,
- ICIVIL-GROUP2.

Also in this case, there will be a preconfigured appropriate phone number to which Italian Civil Protection groups can reply, in case of SMS text messages.

The Italian Civil Protection positioned inclinometers and extensometers along the two interested rivers and on some infrastructures (in a range of 40km from the epicentre) to



monitor the level of the water and the movements of some critical buildings after the disaster has occurred and data starts to be gathered. This activity is approached through the DESTRIERO platform HMI in which the Chief of the resources management of the Italian Civil Protection has created a new plan.

The creation of a new plan requires accomplishing the following steps:

1. Insert general information related to the new plan to be started. This action requires the DESTRIERO operator to insert,
 - a. The name of the Plan, a textual string that identifies the plan to be started,
 - b. A start date, indicating the time in which the plan will be started.
 - c. A Location, that represents where the plan will be conducted,
 - d. A Postal Code (hereinafter called PCode), represent the postal code of the location in which the plan is created,
 - e. A Plan Type, that identifies the nature of the plan to be started,
 - f. A description of the plan that identifies the common action and the objectives of the plan.
2. Once general information have been inserted the operator, by continuing the new plan creational process, must insert the steps (or also called activities) that will characterize the plan (what is necessary to do) by adding,
 - a. A name, that univocally identifies the step to be created,
 - b. A start date, indicating the time in which the activity will be started,
 - c. An end date, which represents the expected activity time of the plan.
 - d. A Location, that represents where the plan will be conducted,
 - e. A step type (chosen from a predefined list), indicates the kind of activity that should be conducted (e.g. operational, coordination etc.),
 - f. Organizations' groups that will be involved in the activity,
 - g. A description that clearly explains what the step should do.

The operator is free to add the required number of steps for the operation to be accomplished by clicking a "plus" button on the HMI.

The first part of the process is accomplished by inserting the following plan data through the DESTRIERO HMI:

- *Name:* Inclinometers and Extensometer Displacement
- *Start Date:* 10/12/2015,
- *Location:* Sayatón, Jose Cabrera Nuclear Plant, Pastrana,
- *PCode:* 19119,
- *Type:* OPERATIONAL
- *Description:* the selected teams must displace inclinometers and extensometers in a defined area.



Activity plan is defined as follows:

- **STEP 1**

Name: Sensors Displacement,

Start Date: 10/12/2015 08:00 (CET),

End Date: 10/12/2015 12:00 (CET),

Location: Tajo River, Guadiela River

Type: OPERATIONAL,

Assigned to: ICIVIL-GROUP1,

Description: Positioning of inclinometers in the following coordinates,

- Inclinometer-1-RiverTajo: 40.351411, -2.88090,
- Inclinometer-2-RiverTajo: 40.373159, -2.853992,
- Inclinometer-3-RiverTajo: 40.365119, -2.848329,
- Inclinometer-1-RiverGuadiela: 40.397728, -2.790281,
- Inclinometer-2-RiverGuadiela: 40.361325, -2.815518.

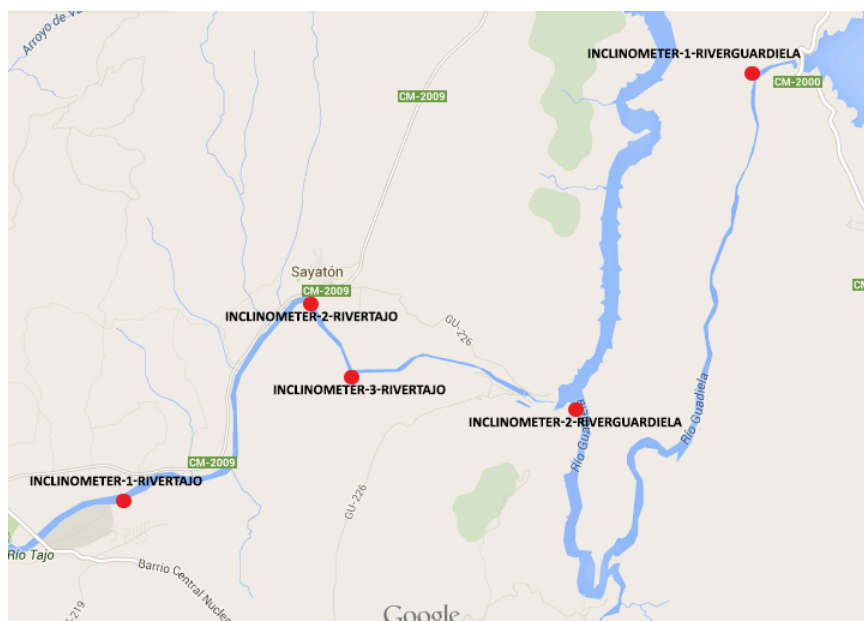


Figure 6 - Inclinometers Positions

- **STEP 2**

Name: Sensors Displacement,

Start Date: 10/12/2015 15:00 (CET) ,

End Date: 10/12/2015 20:00 (CET),

Location: Tajo River, Guadiela River,

Assigned to: ICIVIL-GROUP2,

Type: OPERATIONAL,



Description: ICIVIL-GROUP2 is responsible for the positioning of extensometers:

- Extens-1-Hospital (La Residencia de Princesa de Eboli): 40.415017, -2.919747,

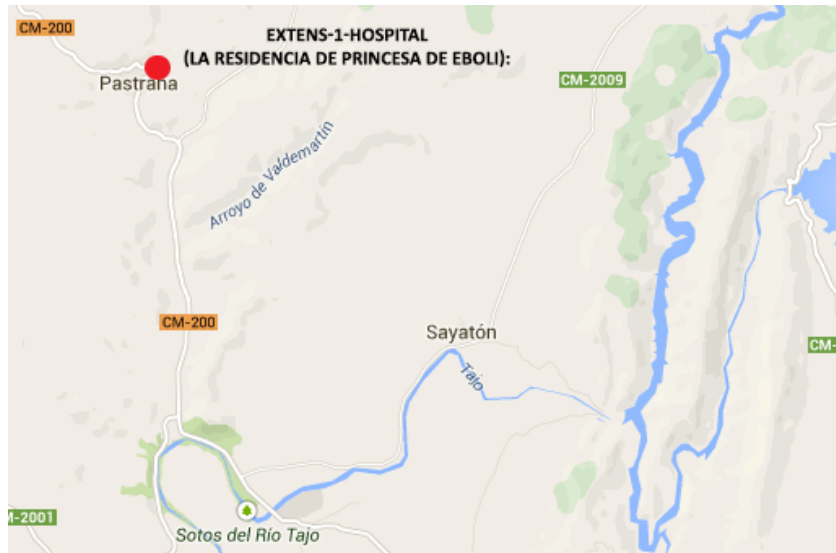


Figure 7 - Extensometer for La Residencia Hospital in Pastrana

- Extens-2-SayatonHome: 40.375688, -2.853452,
- Extens-3-SayatonHome: 40.376244, -2.851284,
- Extens-4-SayatonHome: 40.378206, -2.853967.

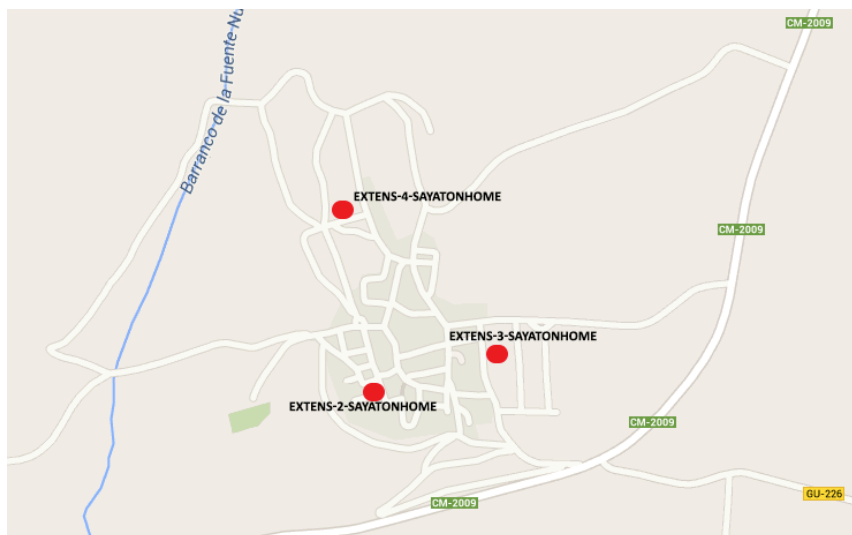


Figure 8 - Extensometers Position in Sayatón

The data, that is gathered continuously starting from T0+72, is sent to the platform, stored and updated.



3.1.3 T0 + 96 (hours) – Geo-referenced crowdsourcing

The Police Officer decides to analyse the area near Sayatón due to the fact that the city is not far away from the Tajo River and, consequently, buildings and streets' connections have been seriously damaged. To speed up a first assessment process the police operator, that interacts with the DESTRIERO HMI, by enabling an appropriate function, selects an area of interest (hereinafter AoI) on the map (Figure 9) and then puts into a one field form the following keywords comma-separated: crisis, flood, Sayatón. The AoI and keywords are provided as input to the Geo-Crowdsourcing System that retrieves all relevant feeds from several social networks (e.g. Facebook and Twitter), geo-references them and then semantically analyses them in order to filter only feeds related to the disaster and to the inputs provided. Such feeds are displayed on a map, retrieved through the WebGIS system, to the users within DESTRIERO HMI. The Police Officer browses feeds represented on the map in order to look for texts, videos or images (provided as internet URI) that could help to make decisions or to make a common picture of what has happened in the affected area.

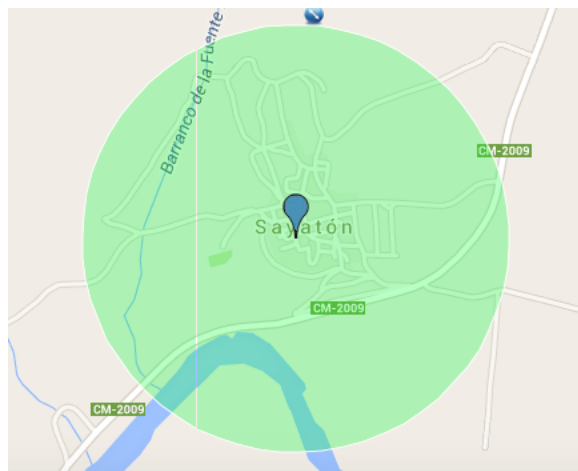


Figure 9 - Area of Interest for the Geo-Crowdsourcing System

3.1.4 T0 + 100 (hours) – Setup of an activity plan for damage assessment

Once the Police Officer assesses the situation, he notices that the main street, useful to access the city (40.374686, -2.849571), is blocked due to the flooding, so a more accurate analysis is needed on the field. The Police Officer, applying commands received from its superiors, decides to create a new plan to assess the Sayatón area by selecting the appropriate menu voice visible in the DESTRIERO HMI.

Following the above-defined steps, the operator fills the initial form by inserting the following data:

- *Name:* Damage Assessment,
- *Start Date:* 11/12/2015,
- *Location:* Sayatón,



- *PCode*: 19119,
- *Type*: COORDINATION, OPERATIONAL, REPORT,
- *Description*: the selected team must assess the building and the street damages.

Then he starts to add the necessary steps:

- **STEP 1**

Name: Groups Availability,

Start Date: 11/12/2015 08:00 (CET) ,

End Date: 11/12/2015 08:30 (CET),

Location: Police Command and Control Centre, Conference Call,

Type: COORDINATION,

Assigned to: Police Officer,

Description: coordinate the plan steps with allocated resources through a conference call.

- **STEP 2**

Name: Assess Street Damages,

Start Date: 11/12/2015 09:30 (CET) ,

End Date: 11/12/2015 11:30 (CET),

Location: Sayatón,

Type: OPERATIONAL,

Assigned to: POLICIA-GROUP1

Description: A Sayatón accesses' streets damages assessment is required. Accesses to be assessed at coordinates (Figure 10),

- Point 1: 40.374698, -2.849627,
- Point 2: 40.377281, -2.846816,
- Point 3: 40.380281, -2.845620,
- Point 4: 40.375932, -2.858430.

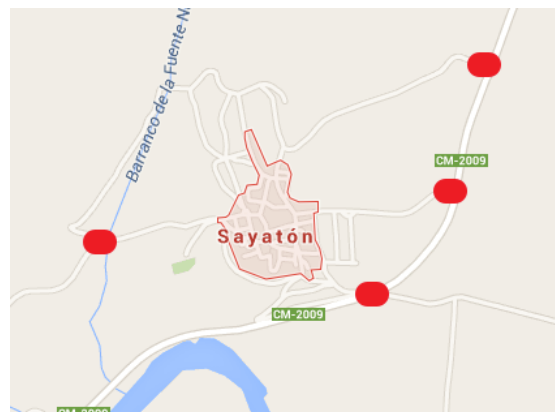


Figure 10 - Sayatón Road Access to be assessed

- **STEP 3**

Name: Infrastructure and Social Sector assessment,

Start Date: 11/12/2015 09:30 (CET),

End Date: 11/12/2015 11:30 (CET),

Location: Sayatón,

Type: OPERATIONAL,

Assigned to: POLICIA-GROUP2

Description: A Sayatón infrastructure damages assessment must be accomplished. Several checks must be done in the city centre and in the farms that surround Sayatón.

- **STEP 4**

Name: Gather and Evaluate Information,



Location: Sayatón,
Start Date: 11/12/2015 11:30 (CET) ,
End Date: 11/12/2015 13.30 (CET),
Type: REPORT,
Description: Groups deployed on the field must report the information they gathered on the field with the use of their mobile devices.
Assigned to: POLICIA-GROUP1, POLICIA-GROUP2.

Once the Police Officer ends the insertion of the steps, he decides to submit to the platform the created plan. At this stage, the system starts to check, automatically, if redundant plan have already been initiated by other organizations. A conflict is found and the platform displays the plans in conflict through the DESTRIERO HMI. The Italian Civil Protection has already started a plan whose scope is to assess Sayatón building and street damages. This plan can be described as follows:

- *Name:* Damage Assessment,
- *Start Date:* 11/12/2015,
- *Location:* Sayatón,
- *PCode:* 19119,
- *Type:* OPERATIONAL, REPORT,
- *Description:* the selected team must assess the building and the street damages near the Sayatón area and in the town centre.

Then he starts to add the necessary steps:

- **STEP 1**
Name: Street Damage Assessment,
Start Date: 11/12/2015 10:30 (CET) ,
End Date: 11/12/2015 12:30 (CET),
Location: Sayatón,
Type: OPERATIONAL,
Assigned to: ICIVIL-GROUP1,
Description: Sayatón street assessment is needed. Check the city centre and from Calle los Mártires to CM-2009 (6) street entrance.
- **STEP 2**
Name: Needs assessment,
Start Date: 11/12/2015 09:30 (CET) ,
End Date: 11/12/2015 12:00 (CET),
Location: Sayatón,
Type: OPERATIONAL,
Assigned to: ICIVIL-GROUP2,
Description: sectorial needs assessment.
- **STEP 3**
Name: Report Gathering,



Start Date: 11/12/2015 12:30 (CET) ,
End Date: 11/12/2015 16:00 (CET),
Location: Sayatón,
Type: REPORT,
Assigned to: ICIVIL-GROUP1, ICIVIL-GROUP2,
Description: send all the gathered information to the command centre.

Three possibilities are given to the Police Officer:

1. To send a request for joining the Italian Civil Protection plan, in order to provide major support to an already started plan,
2. To send an invite to the Italian Civil Protection to let them join the Spanish National Police operations,
3. To accept anyway the submitted plan.

The Police Officer chooses to send a request for an invite in order to support the Italian Civil Protection (point 1). The system, through a notification mechanism displayed into the HMI notification bar, notifies the Italian Civil Protection about the request for offering help by the Spanish National Policia. The Chief of the Resources Management of the Italian Civil Protection accepts the request and the Spanish National Police is automatically added to the plan.

Once the Police Officer has consolidated the merged activity, it is persisted in the database and shared with the other nodes in the interoperability network. Other DESTRIERO native users can visualize the updated plan on the map through their DESTRIERO HMIs.

3.1.5 T0 + 101 (hours) – Setup of a plan for CBRN assessment

In the meanwhile, the Spanish Ministry of Interior states that a second more detailed CBRN assessment near the Jose Cabrera Nuclear Power Plant is necessary and decides to coordinate the operations through the DESTRIERO platform by using the ne.on advance feature that is able to estimate affected areas after a nuclear incident and moreover offers the possibility to manage army forces activities. The calculations are done according with the NATO standard ATP45(D) that requires the following information in order to calculate the estimation:

- A. Date time of the nuclear incident at Jose Cabrera Power Plant,
- B. Size of the release in relative terms (Small, Large or Extra Large),
- C. Meteorology present in the area when the incident happens and in the following hours.

The information in point (A) is already available and refers to the starting date of the disaster that the DESTRIERO platform is managing. Furthermore, a first CBRN assessment has been done during the initial 72 hours to get a first approximation on the entity of the CBRN contaminations. This evaluation stated that the size of the release in relative terms was equal to LARGE and characterizes the information in point (B). Finally, information in point



(C) is available into the DESTRIERO platform thanks to its capability related to meteorological information source live retrieval.

Once the information is ready, the Chief of the Army Staff could request the estimation of the theoretical affected areas to ne.on advance. The three distances R1, R2, and R3 will be then received and represented in DESTRIERO through a map visualization presented in the HMI (see next plan description).

These areas are defined with three distances:

1. R1 - Potential Long-term Hazard (up to 300 km)
2. R2 - Potential Acute Hazard (up to 15 km)
3. R3 - Potential Severe Hazard (up to 2 km)

According to the ATP45(D), after the calculation of the affected areas is necessary to measure the real contamination contour lines. Special teams that move along the affected area measuring the radiation levels to get several polygonal areas each one of them representing a contour line of a specific contamination/radiation value usually perform this operation. If the measurements are responsibility of military organisations it should be possible to coordinate the gathering process using ne.on advance and send the final contour lines as polygonal areas to DESTRIERO platform.

The Chief of the Army Staff decides to start a new plan through the DESTRIERO HMI and, as previously seen, a form must be filled in to indicate the objective of the plan and the steps that will characterize the plan itself. This plan is mandatory in order to be able to better assess contaminated areas by measuring contaminations' levels with the use of CBRN sensors to let ne.on platform evaluate the real contour lines of the CBRN affected area.

The first form is filled as follows:

- *Name:* CBRN assessment,
- *Start Date:* 11/12/2015,
- *Location:* Central Nuclear José Cabrera,
- *PCode:* 19119,
- *Type:* COORDINATION, OPERATIONAL, REPORT
- *Description:* the selected team must assess the CBRN contaminations near the Jose Cabrera Nuclear Plant.

The second form, related to the plan steps, is filled as follows:

- **STEP 1**
Name: Theoretical CBRN Assessment,
Start Date: 11/12/2015 10:00 (CET),
End Date: 11/12/2015 11:30 (CET),
Location: Army Command and Control Centre
Type: OPERATIONAL,
Assigned to: Chief of the Army Staff,
Description: To better analyse the data that is going to be gathered on the field a first



theoretical assessment is needed. Request to ne.on a theoretical assessment for the affected area.

- **STEP 2**

Name: Group Availability,

Start Date: 11/12/2015 13:00 (CET),

End Date: 11/12/2015 13:30 (CET),

Location: Army Command and Control Centre, Conference Call,

Type: COORDINATION,

Assigned to: Chief of the Army Staff,

Description: coordinate the plan steps with allocated resources through a conference call.

- **STEP 3**

Name: Assess CBRN Contaminated Areas,

Start Date: 11/12/2015 13:00 (CET) ,

End Date: 11/12/2015 18:00 (CET),

Location: Jose Cabrera Nuclear Plant,

Type: OPERATIONAL,

Assigned to: MILITARY-FORCE-GROUP1, MILITARY-FORCE-GROUP2,

Description: assessment of the contaminated area with the use of Colibri and Falcon 5000 instrumentation.

- **STEP 4**

Name: Gather and Evaluate Information,

Start Date: 11/12/2015 18:00 (CET),

End Date: 11/12/2015 19:00 (CET),

Location: Army Command and Control centre,

Assigned to: Chief of the Army Staff, MILITARY *Type:* REPORT, MILITARY-FORCE-GROUP1 and MILITARY-FORCE-GROUP2,

Description: Deployed on the field groups must report the information they gathered on the field. Data are then processed by ne.on that will produce an assessment of the contaminated areas.

Once the plan is submitted no redundant operations are found and the plan is consolidated. All the DESTRIERO users are able to see the new activity, started by the Spanish Military Army, through the HMI map visualization.

3.1.6 T0 + 102 (hours) – Coordination conference calls

As decided in the first activity plan, the first step to be accomplished is to inform the operational groups for their operations to be accomplished in Sayatón and so the Police Officer decides to start a conference call, by sending invitation to the already created and configured POLICIA-GROUP1 and POLICIA-GROUP2. A voice call is automatically relayed to each of the participants to ask them to join the conference call, which in turn decides whether to join the call by using their phone keypad to respond to the relevant instructions (Interactive Voice Response). Those relief workers belonging to the POLICIA-GROUP1 and



POLICIA-GROUP2 who accept to join the call are included with the other members of the conference call to discuss the steps to proceed in relation to the planned plan. The Police Officer updates the groups that the activities will be conducted in cooperation with the Italian Civil Protection team.

The Chief of the Army Staff to inform MILITARY-FORCE-GROUP1 and MILITARY-FORCE-GROUP2 also starts a conference call to disseminate information about the area to be covered for the CBRN contaminations' evaluations.

3.1.7 T0 + 110 (hours) – On field assessment

Once groups are on the fields, the assessment activity starts and data is gathered. The relief worker could at any point send an SMS message containing details of events on the ground (subsequent landslides, current relief efforts) to a DESTRIERO account phone number(via his phone), which in turn forwards this information to other members of the group. POLICIA-GROUP1 member sends the gathered information about the street damages via SMS to a preconfigured DESTRIERO phone number, in which they specify the point assessed and a level of damage that can be LOW, MEDIUM or HIGH. Four SMS messages are sent by the POLICIA-GROUP1 for all the analysed areas of interest, as exemplified here (via their phone):

- **SMS1** - Analysed: Point 1, Level: LOW
- **SMS2** - Analysed: Point 2, Level: HIGH
- **SMS3** - Analysed: Point 3, Level: MEDIUM
- **SMS4** - Analysed: Point 4, Level: HIGH

POLICIA-GROUP2, using the DESTRIERO HMI for mobile devices from their smartphones or tablet, starts filling reports about the damages assessed for the Sayatón area. Two reports are created:

- **PoliciaReport1:** Infrastructure Assessment, that includes all the data related to the damages to Transport/Roads, Aviation, Water Supply, Police, Defence Forces, Fire and Rescue Services,
- **PoliciaReport2:** Social Sector Assessment, that focuses on Housing, Education, and Health primary necessity.

Once STEP1 and STEP2 of the planned activity have been accomplished successfully, POLICIA-GROUP1 and POLICIA-GROUP2 in order to inform the central station send an SMS predefined template to indicate the end of the steps. Two SMS are then sent:

- **"PLANID, STEP1, END",**
- **"PLANID, STEP2, END".**

The police operator will update the activity plan accordingly to the received information. Also the Italian Civil Protection will be notified of the updates.

A military nuclear safety team of experts (Rad Protection Team), in order to fulfil the task (STEP 2) assigned by the Chief of the Army Staff for the plan named "CBRN assessment"



previously defined, well trained in Health Physics and in the use of instruments, is sent on the field in order to obtain data related to the level of CBRN contaminations in the affected area. Two sub-teams compose the main team: the first one is equipped with a Colibrì tool and is responsible to identify a contamination presence, while the second one is equipped with a FALCON 5000. The first team, composed of two people, sets up four wireless data collector that are linked to the Colibrì system. The team starts walking crossing the area of the José Cabrera Nuclear Plant and the Colibrì collectors start to gather information.

In a different manner, the second team, composed by one people, with a portable Falcon 5000 starts analysing the area that goes from the nuclear plant (CBRNEVAL-POINT1 40.345725, -2.888966, Barrio Central Nuclear) and arrives to Almoncid de Zorita (CBRNEVAL-POINT2 40.328063, -2.851676), to the Cerros Margosos de Pastrana y Yebra (CBRNEVAL-POINT3 40.358170, -2.906141) and to Yebra (CBRNEVAL-POINT4 40.356749, -2.965117). The details on the analysed area are provided in the following picture (Figure 11).

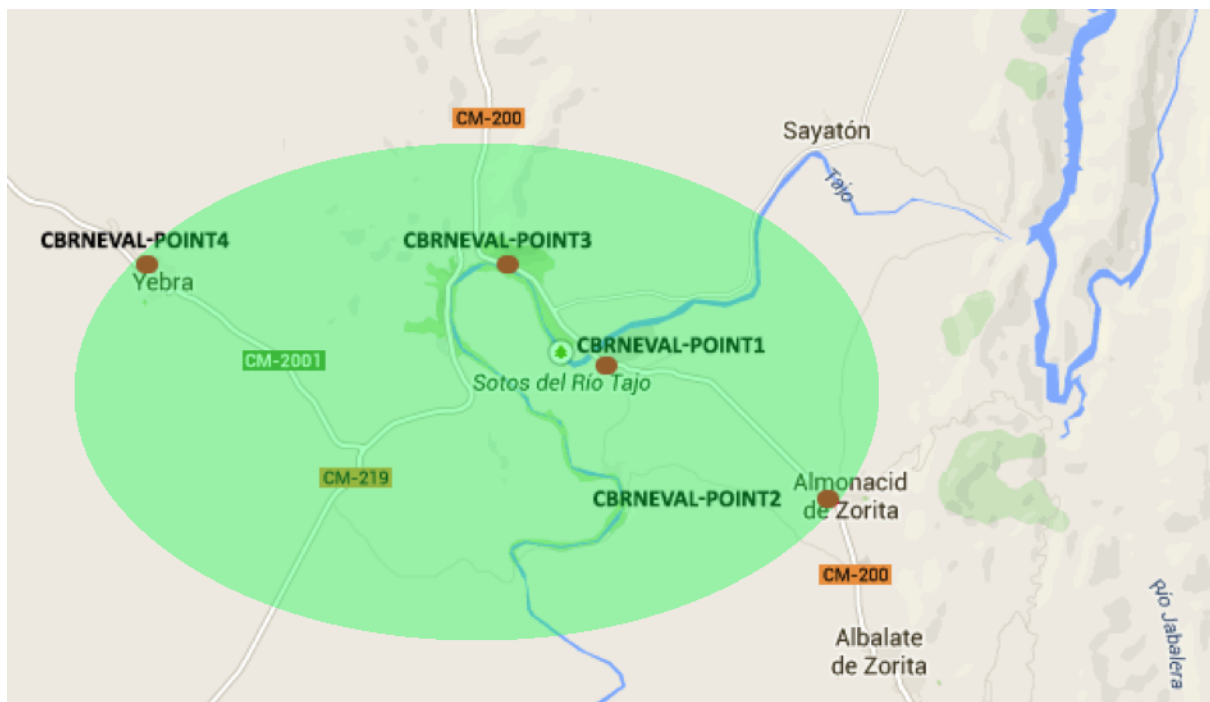


Figure 11 - CBRN Evaluation Area

3.1.8 T0 + 111 (hours) – Reports collection

The Major of Sayatón, through the administrative section of the City Hall, decides to upload through the DESTRIERO HMI all the information related to pre-disaster data concerning population, health and education, information that is partially present inside provided CODs (WHO) uploaded documentation. This data will be uploaded through a dedicated section of the DESTRIERO HMI that enables users to upload pre-disaster data for the interested area. At the same time the Spanish Police Officer uploads within the DESTRIERO platform, through



the DESTRIERO HMI, information like availability of health services, and post-disaster information like population targeted in each area. This data is uploaded manually, through a dedicated form, by using the DESTRIERO HMI.

The Chief of the Resources Management of the Italian Civil Protection, via the DESTRIERO HMI, by selecting an option to upload reports, uploads two different reports named CivProtReport1 and CivilProtReport2 concerning a damage assessment for productive and cross cutting sector respectively.

In the same manner, reconstruction and recovery experts and builder companies (defined in Table 2) upload their reconstruction projects, based on the gathered data, into the system through the HMI. Each of the reconstruction projects must be characterized at least with the following information:

- A *project id*, that is automatically generated by the DESTRIERO platform and that is useful to univocally identify the project within the DESTRIERO network
- A *company name*, whose value identifies the company who proposed the reconstruction project
- A *project name*, a clear and human comprehensive name that identifies the project,
- An area of applicability of the project
- A *required budget* that indicates the costs of the project. This value is represented in € and corresponds to the total budget needed for a single project
- A *description*, whose value indicates the projects objectives and how they will be achieved

Twelve reconstruction projects have been uploaded into the platform by filling the DESTRIERO HMI forms with the following data:

A. PROJECT 1

- **ID:** RECONSTR_PROJ_01,
- **COMPANY NAME:** ReconstructionCompany1,
- **NAME:** School Reconstruction Sayatón 1,
- **LOCATION:** Sayatón west,
- **IMPACTED AREA:** Sayatón west,
- **CONTRIBUTION:** 4 primary school classes
- **REQUIRED BUDGET:** 220.000,00€,
- **DESCRIPTION:** One school in the west area of Sayatón has been damaged. Several classes have to be rebuilt.

B. PROJECT 2

- **ID:** RECONSTR_PROJ_02,
- **COMPANY NAME:** ReconstructionCompany2,
- **NAME:** School Reconstruction Sayatón 2,
- **LOCATION:** Sayatón west,
- **IMPACTED AREA:** Sayatón west,
- **CONTRIBUTION:** 5 primary school classes



- **REQUIRED BUDGET:** 250.000,00€,
- **DESCRIPTION:** One school in Sayatón has been damaged. Several classes have to be rebuilt.

C. PROJECT 3

- **ID:** RECONSTR_PROJ_03,
- **COMPANY NAME:** ReconstructionCompany3,
- **NAME:** School Reconstruction Sayatón 3,
- **LOCATION:** Sayatón west,
- **IMPACTED AREA:** Sayatón west,
- **CONTRIBUTION:** 6 primary school classes
- **REQUIRED BUDGET:** 270.000,00€,
- **DESCRIPTION:** One school in Sayatón has been damaged. Several classes have to be rebuilt.

D. PROJECT 4

- **ID:** RECONSTR_PROJ_04,
- **COMPANY NAME:** ReconstructionCompany1,
- **NAME:** Hospital Reconstruction 1,
- **LOCATION:** Pastrana south,
- **IMPACTED AREA:** Pastrana, Sayatón
- **CONTRIBUTION:** 40 hospital beds.
- **REQUIRED BUDGET:** 1.000.000,00€,
- **DESCRIPTION:** The Pastrana Hospital has been really damaged due to the consequences of the earthquake. There is a need to repair the building and the machinery used.

E. PROJECT 5

- **ID:** RECONSTR_PROJ_05,
- **COMPANY NAME:** ReconstructionCompany2,
- **NAME:** Hospital Reconstruction 2,
- **LOCATION:** Pastrana east,
- **IMPACTED AREA:** Pastrana, Sayatón
- **CONTRIBUTION:** 50 hospital beds.
- **REQUIRED BUDGET:** 1.200.000,00€,
- **DESCRIPTION:** The Pastrana Hospital has been really damaged due to the consequences of the earthquake. There is a need to repair the building and the machinery used.

F. PROJECT 6

- **ID:** RECONSTR_PROJ_06,



- **COMPANY NAME:** ReconstructionCompany3,
- **NAME:** Hospital Reconstruction 3,
- **LOCATION:** Pastrana east,
- **IMPACTED AREA:** Pastrana, Sayatón
- **CONTRIBUTION:** 45 hospital beds.
- **REQUIRED BUDGET:** 1.070.000,00€,
- **DESCRIPTION:** The Pastrana Hospital has been really damaged due to the consequences of the earthquake. There is a need to repair the building and the machinery used.

G. PROJECT 7

- **ID:** RECONSTR_PROJ_07,
- **COMPANY NAME:** ReconstructionCompany3,
- **NAME:** Hospital Reconstruction 4,
- **AREA:** Pastrana south,
- **IMPACTED AREA:** Pastrana, Sayatón
- **CONTRIBUTION:** 60 hospital beds.
- **REQUIRED BUDGET:** 1.310.000,00€,
- **DESCRIPTION:** The Pastrana Hospital has been really damaged due to the consequences of the earthquake. There is a need to repair the building and the machinery used.

H. PROJECT 8

- **ID:** RECONSTR_PROJ_08,
- **COMPANY NAME:** ReconstructionCompany3,
- **NAME:** Secondary school Reconstruction Pastrana 1,
- **LOCATION:** Pastrana south
- **IMPACTED AREA:** Pastrana
- **REQUIRED BUDGET:** 380.000,00€,
- **CONTRIBUTION:** 10 secondary school classrooms.
- **DESCRIPTION:** A secondary school located in Pastrana has collapsed and has to be rebuilt.

I. PROJECT 9

- **ID:** RECONSTR_PROJ_09,
- **COMPANY NAME:** ReconstructionCompany3,
- **NAME:** Secondary school Reconstruction Pastrana 2,
- **LOCATION:** Pastrana south
- **IMPACTED AREA:** Pastrana
- **REQUIRED BUDGET:** 410.000,00€,
- **CONTRIBUTION:** 12 secondary school classrooms.



- **DESCRIPTION:** A secondary school located in Pastrana has collapsed and has to be rebuilt.

J. PROJECT 10

- **ID:** RECONSTR_PROJ_10,
- **COMPANY NAME:** ReconstructionCompany3,
- **NAME:** Accommodations Reconstruction Pastrana 1,
- **LOCATION:** Pastrana east
- **IMPACTED AREA:** Pastrana
- **REQUIRED BUDGET:** 610.000,00€,
- **CONTRIBUTION:** 25 accommodations.
- **DESCRIPTION:** Several houses have collapsed in Pastrana so several accommodations are proposed to keep the population in the city.

K. PROJECT 11

- **ID:** RECONSTR_PROJ_11,
- **COMPANY NAME:** ReconstructionCompany2,
- **NAME:** Accommodations Reconstruction Pastrana 2,
- **LOCATION:** Pastrana east
- **IMPACTED AREA:** Pastrana
- **REQUIRED BUDGET:** 550.000,00€,
- **CONTRIBUTION:** 21 accommodations.
- **DESCRIPTION:** Several houses have collapsed in Pastrana so several accommodations are proposed to keep the population in the city.

L. PROJECT 12

- **ID:** RECONSTR_PROJ_12,
- **COMPANY NAME:** ReconstructionCompany1,
- **NAME:** Accommodations Reconstruction Pastrana 3,
- **LOCATION:** Pastrana west
- **IMPACTED AREA:** Pastrana
- **REQUIRED BUDGET:** 500.000,00€,
- **CONTRIBUTION:** 18 accommodations.
- **DESCRIPTION:** Several houses have collapsed in Pastrana so several accommodations are proposed to keep the population in the city.

All the gathered data coming from the Colibrì and the Falcon 5000 acquired by the two military teams is extracted as logged data in a csv file from the tools and uploaded, through the DESTRIERO HMI, into the platform by the Chief of the Army Staff. The system receives loaded sensors information and produces a contamination report that is distributed within the DESTRIERO infrastructure. The generated report contains the real contour lines of the CBRN affected area.



3.1.9 T0 + 112 (hours) - Display of assessment maps

The Chief of the Resources Management of the Italian Civil Protection requests the damage assessment data to be displayed on the map in the DESTRIERO HMI and browses data displayed on the map using zoom in/out and pan functionalities and displays information of a particular object by clicking on it. If further map details are requested they are directly retrieved by the use of the WebGIS platform. After viewing map data he also decides to view the most accessed reports, through a specific HMI section, in order to understand the most important information to be consulted.

The Chief of the Army Staff instead decides to inspect ne.on evaluations that take into account sensors measurements and weather conditions and forecasts retrieved from OpenWeatherMap. All the evaluations are displayed on the map so that the Chief of the Army Staff makes decisions on future plans to be conducted. Furthermore, in order to be able to understand the evolution of the damages of the José Cabrera Nuclear Plant, he decides to start the playback functionality of DESTRIERO platform, accessible through a specific HMI section. The playback functionality is characterized by a timeline bar that goes from T0 to T0+112 (more generally T0 + x, where x is the instant of time in which the functionality is requested) that can be used by the Chief of the Army Staff in order to retrieve map data in a time-filtered mode.

3.1.10 T0 + 114 (hours) – Decision making on reconstruction projects

Once “on the field data” has been gathered, an analysis can be started to evaluate reconstruction and recovery plans so a decision maker that belongs to the Spanish Ministry of Interior, agency of the General Direction of the Spanish National Police and Civil Guard, decides to start a decision support operation in order to obtain the fundable projects that have been previously uploaded into the platform and compare each other. The Decision Maker, through the DESTRIERO HMI, selects the Sayatón area and inserts the available budget that can be funded for the projects and that is equal to 4.900.000,00€. Once the operator submits the request, the DESTRIERO Myriad module starts to act receiving as inputs:

- Data related to the identification of damaged area assessments,
- Evaluation for sectorial needs,
- Proposition of reconstruction projects by builder companies,
- Data related to disasters consequences for each reconstruction project area,
- The funds necessary to put in practice the proposed projects.

Once inputs are provided, the platform proceeds with the identification of the fundable set of reconstruction projects that best fits the population sectorial needs and that takes into account the global situation. Results are shown through the DESTRIERO HMI and can be used by the high-level reconstruction decision-makers for the attribution of priorities to reconstruction projects. The output of the process is a set of projects that are fundable for the area that has been selected and that are ordered according to their priority. By looking at



the output the operator receives a help (decision support) in choosing the right project to be funded.

3.1.11 T0 + (At least 1 month) – Generation of the DaLA report

The Spanish Ministry of Interior decides to generate a DaLA report in order to evaluate all the crisis management operations accomplished, all the sustained costs and, finally, all the reconstruction activities that have been conducted. The report is generated and displayed through the HMI and, if requested, could be also exported as a pdf file. The DaLA report can be re-created when necessary and will be characterized with up-to-date data that is stored within the DESTRIERO platform.

3.2 Sources/Tools Interactions

Based on identified Scenario, flows of interactions have been reported, where Information Sources/Tools Subset interact each other to provide specific output on DESTRIERO HMI on User Request.

In next paragraphs, systems interactions have been provided based on specific scenario time: based on template provided in Table 3, a sequence has been realized to properly show described communications through the DESTRIERO Infrastructure.

Table 3 - Interaction Phase Template

Phase	Specific Scenario Time Phase
Sub-Phase	Specific Scenario Sub-Phase
Information Services	Involved Sub-Phase Information Services
Utility Services	Involved Sub-Phase Utility Services
Core Services	Involved Sub-Phase Core Services
Information/data Sources	Involved Information/Data Sources
DESTRIERO Systems	Involved DESTRIERO Systems
Description	Description of scenario phase interactions