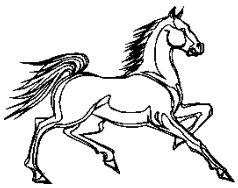

DESTRIERO

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

D2.1 – Requirements specification and collaboration needs

Grant Agreement no.: **312721**
Call identifier: **FP7-SEC-2012.4.3-1**

Start date of project: 01/09/2013 Duration: 36 months

Deliverable:	**D2.1**
Title:	**REQUIREMENT SPECIFICATION AND COLLABORATION NEEDS**
Due Delivery Date:	**28-02-2014**
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Lead Contractor for this deliverable:	**UPVLC**

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Contributor:	**CINI, TRT, AMPER, UPVLC, FHG, INNO, ITTI, BFAST, PSNI, SGSP, SESM, AMI**
Dissemination Level:	**RE**
Version:	**01.00**
Document Description:	**The document consists of two parts: User requirements gathering and analysis (T2.1) and Collaborative working needs (T2.2). User requirements have been analysed and prioritized and the collaboration needs have been exemplified.**

Revision History

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T2.2 - 0.1	First draft	08.11.2013	T. Vandieken W. Engelbach
T2.2 - 0.2	Revised first draft	05.12.2013	T. Vandieken W. Engelbach
T2.1 - 01.00	First draft	18.12.2013	F. Carvajal L. Szklarski
T2.2 - 0.3	SGSP Examples added	14.01.2014	S. Ptak T. Vandieken
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T2.1 - 03.00	Revised second draft	27.01.2014	F. Carvajal L. Szklarski
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D2.1 – 0.1	Introduction of additional comments from AMPER	12.02.2014	F. Carvajal
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D2.1 – 0.2	Summary and conclusions added	14.11.2014	J. Gómez Lasquetty

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1 SUMMARY

This document collects the outcomes of Task 2.1 "User requirements gathering and analysis" and Task 2.2 "Collaborative working needs". Both tasks have been performed in parallel during the first 6 months of the project and their results will put the basis for further WP's.

The first part of the document corresponds with the results of task 2.1. The objective of this task is to collect the end user requirements, expectations and needs for DESTRIERO. This information is gathered by applying several methodologies, e.g., questionnaires, surveys, and interviews with end users and desktop research of public sources of information.

After defining a methodology to capture the end users requirements, a draft questionnaire is proposed to the partners to be refined and validated after an iterative process. Then, the resulting questionnaire is distributed among the end users community.

Aditionally, a workshop with the end users is organised to present the project goals and the proposed scenario. During the workshop, the attendees provide feedback on procedures, needs and detected gaps. Also new user requirements not stated in the already filled questionnaires are added. The user requirements collected from questionnaires and workshops are then merged and prioritized according to their scoring.

Finally, traceability matrix concept is proposed as the mechanism used by the consortium to guarantee the correct tracking and accomplishment of the most prioritized requirements.

The second part of the document corresponds to the results of task 2.2 and includes exemplified outlines of collaboration working needs based on the Post Disaster Needs Assessment (PDNA) framework and the four major steps: Establishment of baseline information (pre-disaster), determination of the impact via assessments, decision making and recovery and reconstruction activities.

The scope of this task is to provide a fundamental understanding and an overview of the collaborative working needs of the national and international relief units during recovery and reconstruction activities. These needs should be analysed with regards to information management challenges.

Key dependencies between the actors are outlined by the description of typical procedures, tasks and methodologies. The related information needs are provided. Finally, examples from the involved end-users and a more generic introduction complete the document. Thus a versatile understanding of the collaborative working needs is provided.

2 Reference Documents

Document name
[1] Amin, S. and Goldstein, M. (2008), Data against Natural Disasters: Establishing Effective Systems for Relief, Recovery, and Reconstruction, The World Bank, Washington DC.
[2] Bennett, J., Bertrand, W., Harkin, C., Samarasinghe, S. and Wickramatillake, H. (2006), Coordination of International Humanitarian Assistance in Tsunami-affected Countries.
[3] Bollin, C. and Khanna, S. (2007), Review of Post Disaster Recovery Needs Assessment and Methodologies: Experiences from Asia and Latin America.
[4] Choo, C.W. (2002), Information management for the intelligent organization: The art of scanning the environment, 3rd ed, Information Today, Medford, NJ.
[5] Cluster Working Group on Early Recovery (CWGR) in cooperation with the UNDG-ECHA Working Group in Transition (2008), "Guidance Note on Early Recovery", available at: https://docs.unocha.org/sites/dms/Documents/Guidance%20note%20on%20Early%20Recovery.pdf (accessed 14 October 2013).
[6] Czajkowski, J. M. (2007) Leading Successful Interinstitutional Collaborations Using the Collaboration Success Measurement Model. Paper presented at the Chair Academy's 16th Annual International Conference: Navigating the Future through Authentic Leadership, Jacksonville, Florida.
[7] Darcy, J. and Hofmann, C.-A. (2013), "Humanitarian Needs Assessment and Decision-Making", available at: http://www.odi.org.uk/sites/odi.org.uk/files/odi-assets/publications-opinion-files/347.pdf (accessed 28 November 2013).
[8] Duyne, J.E. (2010), "Safer homes, stronger communities: a handbook for reconstructing after natural disasters", available at: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2010/01/27/000334955_20100127044847/Rendered/PDF/528390PUB0safe101Official0Use0Only1.pdf (accessed 5 December 2013)..
[9] FP7-SEC-2012-1 (2012), "DESTRIERO – Description of Work", Collaborative project CP-FP, European Commission.
[10] Guha-Sapir, D., Hoyois, P., Below, R. (2013): "Annual Disaster Statistical Review 2012: The numbers and trends", available at: http://reliefweb.int/sites/reliefweb.int/files/resources/ADSR_2012.pdf (accessed 16 January 2014).
[11] Harpviken, K. B., Millard, A. S., Kjellman, K. E. and Strand, A. (2001), "SIDA's contributions to humanitarian mine action", available at: "http://www.sida.se/Publications/Import/pdf/sv/Sidas-Contributions-to-Humanitarian-Mine-Action---Final-Report.pdf"
[12] Humanitarian Response Pakistan (2011), "Guide for the Preparation of Post-Disaster Needs Assessments and Recovery Frameworks (PDNAs). Preparation and Conduct of a PDNA with PDNA Toolkits", Interim Draft - August 2011, available at: http://www.pakresponse.info/Portals/0/Emergencies/Floods2011/Funding/PDNA%20guidance_draft%20Aug2011.doc.

Document name
[13] IDA Foundation (Ed.) (2011), "Interagency Emergency Health Kit 2011", available at: http://www.idafoundation.org/fileadmin/user_upload/Documenten/PDF/Product_Library/brochure_IEHK2011_1013_IDA_IEHK1_FS_1014.pdf (accessed 23 January 2014).
[14] Inter-Agency Standing Committee (IASC) (2010), "IASC Guidelines Common Operational Datasets (CODs) in Disaster Preparedness and Response", available at: http://www.phtpacific.org/sites/default/files/manual_guidance_handbook/1/files/IASC_OperationalGuidance_CommonOperationalDatasets_DisasterPreparednessResponse_v5.pdf (accessed 14 October 2013).
[15] Inter-Agency Standing Committee (IASC) (2012), Operational Guidance for Coordinated Assessments in Humanitarian Crises.
[16] OFDA (1992), "OFDA Internationally agreed glossary of basic Terms related to Disaster Management", DHA-Geneva - December 1992.
[17] Pan, S.L., Pan, G. and Leidner, D.E. (2012), "Crisis Response Information Networks", Journal of the Association for Information Crisis Response Information Networks, Vol. 13 No. 1, pp. 31–56.
[18] Rotimi, J.O.B., Le Masurier, J. and Wilkinson, S. (n. d.), "The Regulatory Framework for effective Post-Disaster Reconstruction in New Zealand".
[19] Saab, D.J., Tapia, A.H., Maldonado, E., Ngamassi Tchouakeu, L.-M., Orendovici, R., van Gorp, A., Maitland, C. and Zhao, K. (2008), "Building global bridges. Coordination bodies for improved information sharing among humanitarian relief agencies", available at: http://wikieducator.org/images/9/98/IT-COP.pdf.
[20] Tchouakeu, L.-M.N., Maldonado, E., Zhao, K., Robinson, H., Maitland, C. and Tapia, A. (2011), "Exploring Barriers to Coordination between Humanitarian NGOs", International Journal of Information Systems and Social Change, Vol. 2 No. 2, pp. 1–25.
[21] UN High Commissioner for Refugees (2006), UNHCR Master Glossary of Terms, June 2006, Rev.1.
[22] UNDP (2002). Human development report 2002: Deepening democracy in a fragmented world. New York, NY: Oxford University Press.
[23] UNOCHA (2006), Guidelines for OCHA Field Information Management.
[24] UNOCHA (2012), "3W Who What Where and Contact Directory. Haiti, January 23rd, 2012", available at: http://www.heart-for-haiti.org/documents/Health-Care/Health-Cafe-Haiti-information_Contact-report-23_01_12.pdf (accessed 3 December 2013).
[25] UNOCHA (2013), "The Decision Makers Taxonomy. UN Office for the Coordination of Humanitarian Affairs; Digital Humanitarian Network", available at: http://reliefweb.int/report/world/decision-makers-taxonomy (accessed 14 October 2013).
[26] UNOCHA (n. d.), Common Operational Datasets for the Management of Humanitarian Information in Asia and the Pacific v1 0.

Document name
[27] Van de Walle, B. and Dugdale, J. (2012), "Information management and humanitarian relief coordination. Findings from the Haiti earthquake response", International Journal of Business Continuity and Risk Management, Vol. 3 No. 4, pp. 278–305.
[28] Volere Requirements Specification Template, http://volere.co.uk/

3 Table of Acronyms

Acronym	Description
3W	Who does What Where
4W	Who does What Where and When
ALICE	Adaptive Layers for Information and Collaboration in Emergency
ALNAP	The Active Learning Network for Accountability and Performance in Humanitarian Action
AMI	Assistência Médica Internacional
BCM	Business Continuity Plans
CODs	Common Operational Datasets
CRED	The Centre for Research on the Epidemiology of Disasters
CRIP	Common Recognized Information Picture
CWGER	Cluster Working Group on Early Recovery
DG	Directorate-General
DoW	Description of Work
DSS	Decision Support System
DTP3	Diphtheria-Tetanus-Pertussis
DVI	Disaster Victim Identification
ECHO	European Commission Humanitarian Office
FHG	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V.
GDACS	Global Disaster Alert and Coordination System
GIS	Geographic Information System
HAP	Humanitarian Accountability Partnership
HMI	Human Machine Interface
HQ	Headquarter
IDP	Internally Displaced Persons
IEM	Integrated Emergency Management
IFRC	International Federation of Red Cross and Red Crescent Societies
IO	International Organization
IRA	Initial Rapid Assessment
ISA	Information Multi-Agency Sharing Agreements
LPS	Land and Property Services
MOH	Ministry of Health
NDM	National Decision Making

Acronym	Description
NFRS	National Firefighting and Rescue System (in Poland)
NGO	Non-Governmental Organisation
PDNA	Post Disaster Needs Assessment
PSNI	Police Service of Northern Ireland
Q&A	Quality and Accountability
SAR	Synthetic Aperture Radar
SCC	Strategic Co-ordination Centre
SCG	Strategic Co-ordination Group
SFS	State Fire Service (in Poland)
SGSP	Szkoła Główna Służby Pożarniczej
SRG	Strategic Recovery Group
SWD-ST	System Wspomagania Decyzji – Straż Pozarna (decision support tool and statistical database in Poland)
TCC	Tactical Co-ordination Centre
TCG	Tactical Co-ordination Group
TRIAMS	Tsunami Recovery Impact Assessment and Monitoring System
UNHCR	United Nations High Commissioner for Refugees
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
WHO	World Health Organization
WP	Work Package

Results of task 2.1: User requirement gathering and analysis

4 Requirements collection process

This chapter focuses on the process of collecting end-users requirements.

4.1 Methodology

The DESTRIERO system user requirements gathering process is performed by a set of steps in an iterative methodology. The whole methodology for gathering the DESTRIERO user requirements is represented in the Figure 1.

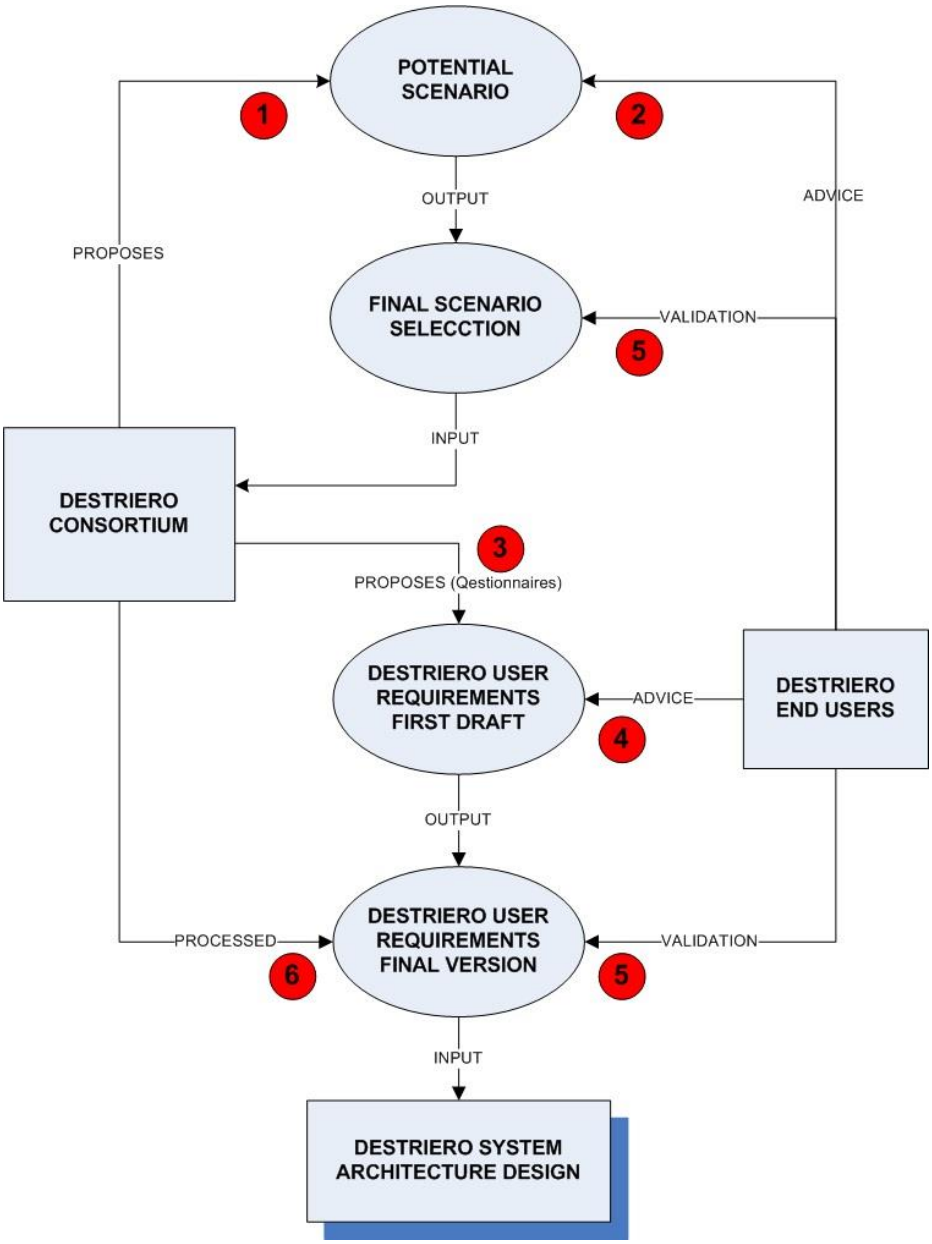

Figure 1 - DESTRIERO User requirements gathering methodology

Firstly, for the selected methodology the scenario had to be defined and vignettes described. This task was performed by the consortium members (including end-users) and refined in an iterative process through e-mail and teleconferences. These activities cover numbers 1 and 2 in Figure 1.

In parallel (See: number 3 in Figure 1), based on the preliminary scenario defined and the expertise of the consortium members, a draft questionnaire for gathering user requirements was proposed and refined by the whole consortium. The questionnaire refinement task was also performed by all the consortium members (including end-users) in an iterative process through e-mail and teleconferences. The result of this task was the final version of the questionnaire agreed by the whole consortium.

Once the final version of the questionnaire was approved by the consortium, the document has been sent to a larger number of DESTRIERO end-users in order to obtain greater number of opinions and feedback from the external end-users. Finally, 20 filled in questionnaires have been gathered (See: number 4 in Figure 1).

In addition, an end-users workshop was organized on December 12th in order to have direct contact with some of the DESTRIERO end-users who had expressed interest in the project.

In this workshop the final scenario was presented and validated by the end-users. In addition, new requirements not previously included in the questionnaire were gathered during the interactive activities with the end-users (questionnaire presentation, role play game, etc.)

Finally, the questionnaire was reviewed by the end-users (See number 5 in Figure 1) and the final set of DESTRIERO user requirements was created.

This final set of user requirements will be the basis for the DESTRIERO system design and development phases.

4.2 End-users workshop details

The DESTRIERO end-users workshop was held on December 12th, 2013 in Paris (Novotel CDG Terminal-Roissypôle Route de l'Epinette). The workshop agenda is presented in the Figure 2.

DESTRIERO

A DEcision Support Tool for Reconstruction and recovery and for IntEroperability of international Relief units in situations, including CBRN contamination Risks

End Users Workshop

Date and venue

Start date and time: **2013-12-12, 10:00**
End date and time: **2013-12-12, 16:15**
Location: **Paris, Novotel CDG Terminal-Roissypôle Route de l'Epinette**

Agenda

12 December 2013 (10:00-16:00h)

Time	Item	Title	Responsible
10:00	1	Welcome	ITTI
10:15	2	DESTRIERO Project presentation	e-GEOS
10:45	3	Workshop objectives	UPV
11:00	4	Role Play	
11:15	6	Scenario presentation	ITTI
11:30	7	Map deployment and role assignation	ALL
11:45	8	Scenario resolution by end users	ALL
12:30	9	End of play and open discussion including Key Performance Indicators (KPIs)	ALL
13:00	10	Lunch	
14:00	11	Questionnaire presentation and filled in	UPV
14:20	12	Interoperability issues	AMPER
14:40	13	potential new requirements collection	UPV
15:00	14	Open discussion	ALL
15:30	15	Impact presentation	Innovalia
15:45	16	Impact questionnaire	Innovalia
16:15	17	AOB & day closure	ALL

Figure 2 - End-users workshop agenda

The consortium organized this end-users workshop with the following objectives:

- **To present the project goals directly to the end-users,**
- **To refine and validate the project scenario,**
- **To obtain feedback from end-users on procedures and needs/gaps, which could be covered by DESTRIERO,**
- **To obtain new user requirements not stated in the questionnaire and already filled-in questionnaires.**

The consortium planned to invite only 5 or 6 end-users due to the budget assigned for this purpose. On the other hand, in order to obtain the bigger dissemination and possible impact the consortium contacted a larger number of potential DESTRIERO end-users and asked them to fill in the questionnaires.

Unfortunately, the previous dates for the workshop, when the consortium had sent the invitations to attend the workshop, coincided with the management of the Filipinas disaster (The typhoon Haiyan stroke Filipinas on the 8th of November) and many end-users that were invited to attend the workshop could not come, since they were very busy due to their involvement in the initial recovery and reconstruction phase of the disaster. Other end-users were not allowed to travel (even though the consortium covered the travel costs) due to the restrictions caused by the current economic crisis in their countries.

Many end-users, to whom invitations have been sent, could not attend the workshop. Nevertheless, they expressed their interest in the project and filled in the questionnaires.

Finally, the following DESTRIERO external end-users attended the workshop:

- **Mr. James Keena from the Irish HSE InterAgency Emergency Management Office, Ireland**
- **Mr. Grzegorz Gudzbeler from Police Academy in Szczytno, Poland**
- **Mr. Jürgen Krempin from Ministry of the Interior and Sports of the Free and Hanseatic City of Hamburg, Fire Service Academy Hamburg, Germany**

During the workshop the following presentations and activities were performed:

- **The project idea and objectives were presented and explained to the end-users,**
- **The workshop objectives were also presented to the end-users,**
- **A role play game was performed. In this role play game the project scenario was presented and the end-users exposed their comments and finally validated it.**

With this scenario in mind the end-users were asked to make the exercise of showing how they would face this scenario with DESTRIERO system. By doing this exercise the consortium obtained information regarding their procedures and the new capabilities/requirements they would expected DESTRIERO system to have to improve their current tasks. Some images of this role play game can be seen below (Figure 3 and Figure 4).

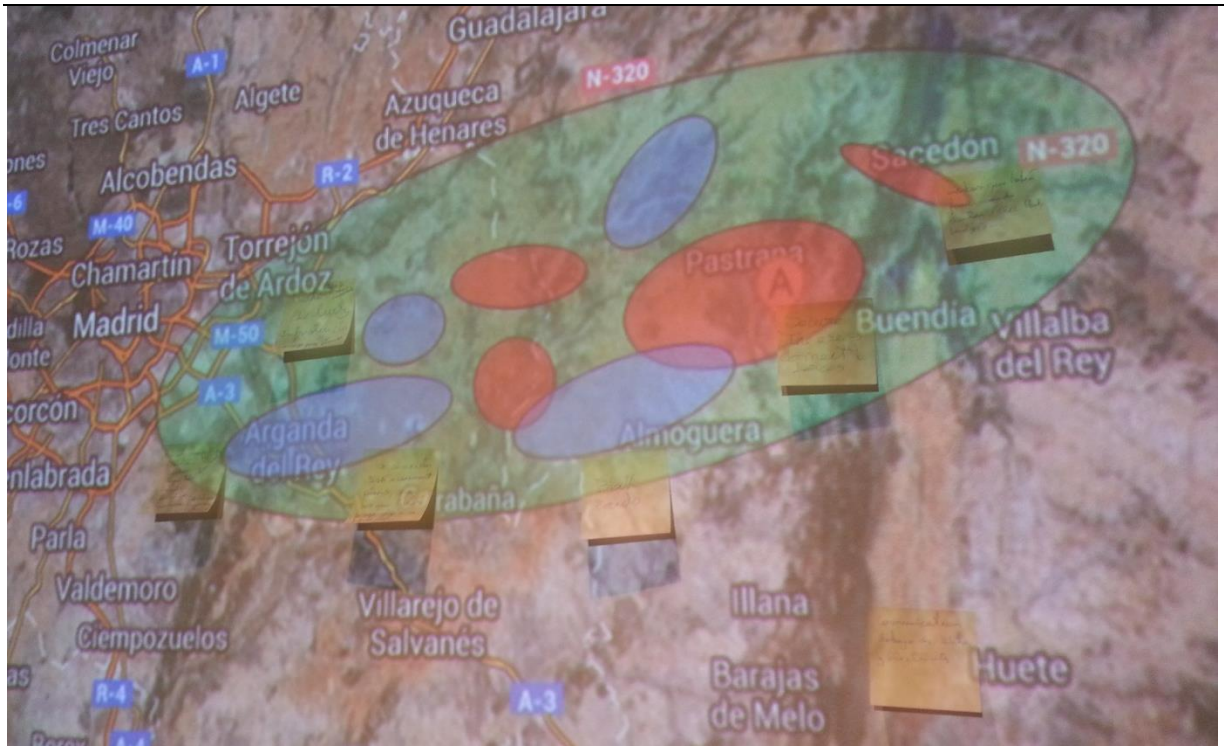

Figure 3 - Role play game with end-users; New requirements gathering

Figure 4 - Role play game with end-users; Open discussion

After the role play game the questionnaire for gathering requirements was presented and one of the end-users, who had not filled in it, did it and commented on his answers.

Then, a short presentation on interoperability issues was performed by AMPER and the end-users discussed this matter with other consortium members.

Finally, a short questionnaire on potential impact of DESTRIERO was filled in by the end-users and the DESTRIERO web page was officially presented.

4.3 Requirements gathering process (collection of end-user requirements, expectations and needs)

The DESTRIERO user requirements gathering process started with the production of the end-users questionnaire in an iterative process. The result of this process was the final version of the questionnaire approved by the whole consortium.

This questionnaire was produced basing on the experience of several DESTRIERO consortium members (including end-users). Nevertheless, each separate section of the questionnaire had a blank square for including new requirements that were not primarily included in the questionnaire or end-users found them important for the system.

Once the final version of the questionnaire was achieved, the document was sent to several potential DESTRIERO end-users previously contacted by some partners of the consortium.

The complete list of contacted end-users and the partner who invited them is shown below:

UPV

- **Unidad Militar de emergencias (UME)**
- **Antonio Ruiz Mateo, Spanish Ministry of building**

SAADIAN

- **James Keena, The Irish HSE InterAgency Emergency Management Office**
- **Dimitri De Fré, Belgian Federal Public Service Health**
- **James Urquhart, Scottish Government Critical Infrastructure Resilience Unit**

SGSP

- **Alan PELLOWE, Managing Director, 112Solutions Ltd., UK**
- **Paolo VACCARI, Presidency of Council of Ministers - Civil Protection Department - International Relations Unit, Italy**
- **Peter HOLMSTROM, Swedish Civil Contingencies Agency**
- **Peter-Bastian HALBERG, Strategic media consultancies with focus on crisis communication and humanitarian information, Denmark**

- **David LYNCH, The Directorate of Customs in Iceland**
- **Peter KAAS-CLAESSON, Danish Emergency Management Agency**
- **Marius DOGEANU, General Inspectorate for Emergency Situations / International Relations Department, Romania**
- **Jurgen Krempin, Hamburg Fire Service Academy, International and University Cooperation / Scientific Projects**
- **Thelin Kristofer, Swedish Civil Contingencies Agency MSB**
- **Christiaans Ronald , Police Officer working for Dutch National Crises Management Coordination Centre, EU Civil Protection Expert, EU mission experience**
- **Lisa Hilleke, UN employee working for humanitarian assistance and civil protection all over the world under UN, EU and RedCross umbrella, working on PhD right now**
- **Richard van Hazebrouck, THW and BBK (DE) senior expert on civil protection, humanitarian aid and CIMIC, broad mission experience, UN, EU, NATO expert**
- **Bill Peterson, US Fire Officer, former Director of 7-th Region of FEMA (6 US states administrated), involved in management of many biggest hurricanes in US**
- **Erie Braakhekke, NL – Dean of Crises Management College of IFV in Arnhem, EU civil protection expert, PhD, psychologist, police officer**
- **Abt Insp. Leo TOUS, Federal Ministry of the Interior; Dep. I/9-ZFB/Civil Protection School; 2514 Traiskirchen, Akademiestraße 3; Tel: +43 5913 39 24 206;CBRN Expert**
- **Stephan Bihl, BBK DE expert, humanitarian and civil protection expert, working under UN, EU and in frames of RedCross/RedCrescent Movement**
- **Juha Höök, Finnish fire officer, former military, worked for Rescue Services College in Kuopio, mission experienced e.g. Kosovo**
- **Alexandra Desiree STIX-KERN, Civil Protection bei Ministry of the Interior, Austria,**
- **Lieutenant-colonel Eric DUVERGER, Adjoint au Directeur des Études, Référent pour l'action européenne et international, Ecole Nationale Supérieure des Officiers de Sapeurs-Pompiers**
- **Alin Mocioi, Escola Nacional de Bombeiros**
- **Vaida Jasenaite, The Firefighters' Training School, Lithuania Person in charge of international relations**

FGH

- **Federal Agency for Technical Relief (THW), Germany**
- **Sanjana Hattotuwa, ICT4Peace Foundation, Special Advisor**

- **Alexandra Krause, Office of the United Nations High Commissioner for Refugees (UNHCR), Information Management Officer**

ITTI

- **Grzegorz Gudzbeler from Police Academy in Szczytno, Poland**

CINI

- **T.R.E. Consortium – Technologies for Building Restoration, Naples, Italy**

Even though many of the contacted end-users could not attend to the workshop they expressed their interest in the project.

Due to this large interest, the consortium could gather 21 questionnaires filled in order to complete the final set of DESTRIERO user requirements.

5 Analysis of gathered requirements

The following chapter contains collected user requirements. They have been gathered from two sources: questionnaires and workshop and all of them are presented in the subsequent subchapters.

5.1 Results of the DESTRIERO questionnaires analysis

The results of the DESTRIERO questionnaires analysis can be found below. The sum of particular answers to a question may not always equal. This is mainly due to the fact that some questions were skipped by the respondents and some of them were multiple choice types of questions. Moreover, some experts shared the opinion that some the questions were unclear to them, which resulted in some questions being left out without an answer. Furthermore, it is possible that some end-users did not want to spend time on writing answers to open questions or followed the interpretation that seemed the only possible for them, without considering other options.

For most of the questions respondents were asked to provide their answers using the scale ranging from 0 to 4, where 0 indicated "Unimportant requirement - with or without this requirement the system is exactly the same" and 4 indicated "Critical requirement - without this requirement the system will be unusable at all". The rest of the questions were open-questions, where a short answer was required.

The questionnaire has been divided into the following categories:

1. General needs and gaps of your organization that could benefit from DESTRIERO
2. General requirements
3. Database and storage requirements
4. Communication requirements
5. HMI requirements
6. Hardware requirements
7. Ethical requirements
8. Collaborative work requirements

The results from each group of questions are presented in the tables below.

5.1.1 General needs and gaps of your organization that could benefit from DESTRIERO

1. Do you perform any particular study/trainings in the field of PDNA/RRP?[1]

Possible answers	Number of answers
0	4
1	4
2	2
3	3

4	5

2. Does your organization have a systematic knowledge about any PDNA/RRP and/or any collected lessons learnt from the past catastrophic events?

Possible answers	Number of answers
0	2
1	0
2	6
3	2
4	8

3. What are the most important capabilities (e.g. sensors, devices, human or technical resources, procedures, knowledge, etc.) necessary to PDNA/RRP?

- Technical capabilities

Possible answers	Median
Sensors	2
Devices	2
Technical resources	2
Analysis tool	3
Information system	3

- Organizational and individual capabilities

Possible answers	Median
Proactivity	2
Procedures/Policing	3
Open intelligence	3
Awareness	3
Knowledge	3
Mindset	3
Cooperation	3
Human resources	4

- Other

Possible answers	Median
Luck	0

4. Is there a collaborative work system within your organization that keeps track of which capabilities/resources are currently available for PDNA/RRP?

Possible answers	Number of answers
Yes	7
No	12

5. Does your organization use collaborative work tools for PDNA/RRP?

Possible answers	Number of answers
Yes	4
No	13

6. Could you please point out gaps and/or limitations (if any) related to used tools? This question was answered by some End-users in a free text area. These are the answered gathered:
    - Generally the biggest issue is the speed of getting an accurate information picture of what has happened in the incident to enable us to plan for response and recovery.
    - Do not support appropriate visualization of gathered information.
    - It's a generic approach based on secondary data.
    - Interoperability, standards, governance around data, security, privacy and field untested.
    - Institutional capabilities can influence the efficiency of the plans.

7. Do you have had field collaborative experience with other organizations?

Possible answers	Number of answers
Yes	15
No	4

- In affirmative case, were such organizations from the same country or different countries?

Possible answers	Number of answers
Same	4
Both	4
Different	7

8. What have been the major issues regarding national and/or international cooperation/communication aspects? (Please note that multiple answers are allowed).

Possible answers	Number of answers
Language	8
Procedures	12
Communication channel	11
Data format	10
Others	0

9. Type/Sources of information crucial for PDNA/RRP decision-making.

- Information sources

Possible answers	Median
Non-professional/unreliable information sources (population, social networks)	1
Channels for alerting	3
Written sources	3
Professional/reliable information sources (experts, mass media)	3
Human sources	3

- Information available before the catastrophe

Possible answers	Median
Society observations	2
Scientific researches	3
Intelligence	3
Information about emergencies	3
Information about location	3
Training	3

- Information produced during the emergency management phase

Possible answers	Median
Announcements of government agencies	3
Time of catastrophe	3
Surveillance/sensorial information	3
Common operational picture	3
Information about emergency event	3
Teams on the field information	4
Severity of catastrophe/type of catastrophe	4

- After emergency management phase

Possible answers	Median
Decision-makers information	3
Information exchange	3

10. Main challenges in the decision making process related to PDNA/RRP activities.

- Political, organizational challenges

Possible answers	Median
Limited equipment and human resources, money, tools	2
Cooperation with media and public	3
Lack of politically motivated decisions	3
Lack of most vulnerable assessment needs	3
Restricted self-reliance resulting from the hierarchical dependence	3

- Situation awareness challenges

Possible answers	Median
Usage of open sources and public information	2
Lack of meaningful Key Performance Indicators (KPI)	3
Information overload	3
Information fusion	3
Lack of overall comprehensive view of situation	3
Lack of information on most vulnerable needs	3
Information obtaining, gathering and analysis	3

5.1.2 General requirements

Possible answers	Median
DESTRIERO system sensor measurements should feed DSS system.	2
DESTRIERO system sensors data should be visible on each DESTRIERO node.	3
DESTRIERO system should incorporate CBRN sensors.	3
DESTRIERO should provide the emergency procedures and protocols to apply in a recovery/reconstruction situations.	3
DESTRIERO system should allow the easy integration of unattended sensors.	3
DESTRIERO system should integrate information flows from satellite devices like SAR for earth resources visualization.	3
DESTRIERO should integrate different types of sensors, including mobile ones.	3
DESTRIERO should allow messaging capabilities from/to nodes in the hot-spot.	3

Possible answers	Median
DESTRIERO should support a wide variety of recovery/reconstruction situations.	3
DESTRIERO outdoor and mobile devices should be weatherproof.	4
DESTRIERO system should be scalable, modular and flexible.	4
DESTRIERO should produce a situation awareness of the whole area.	4
DESTRIERO should be easily deployable and simple to dismantle.	4
DESTRIERO should offer simple interfaces to share data with external organizations.	4

5.1.3 Database and storage requirements

Possible answers	Median
DESTRIERO system should use existing standards for data storage and management.	3
DESTRIERO should use data mining techniques.	3
DESTRIERO system should be capable of using and/or integrating with existing legacy databases.	3
DESTRIERO system should provide means to use stored data for a post crisis playback of what happened.	3
DESTRIERO should store all data gathered during a recovery/reconstruction situations.	3
Only authorized DESTRIERO users should access to the DESTRIERO data.	4
Access to stored data should be done by means of an authentication process.	4
DESTRIERO users should be able to access stored data easily.	4

5.1.4 Communication requirements

Possible answers	Median
DESTRIERO communications should rely on standards. It includes standard Commercial Off-The-Shelf COTS hardware as well as standards for protocols.	3
DESTRIERO communications should allow the integration, as far as possible, with existing legacy systems.	3
DESTRIERO communications technologies should be seamless to its users.	3
DESTRIERO communications should allow prioritization of data flows and of procedures.	3
DESTRIERO should include mechanisms for ensuring its communications channels.	3
DESTRIERO communications should allow high priority data.	3
DESTRIERO communications should coexist with the existing communications without affecting them.	4

Possible answers	Median
DESTRIERO communications should allow interoperability (hardware, software and of procedures) among systems of different agencies and nations.	4
DESTRIERO communications should work, partially, even if a catastrophe destroys existing communications infrastructure.	4
DESTRIERO should work offline when communications are lost.	4
DESTRIERO communications should be reliable.	4

5.1.5 HMI requirements

Possible answers	Median
DESTRIERO console action should permit usage on touchable screens.	2
DESTRIERO console should show Decision Support System (DSS) system inputs, management and results.	2
No DESTRIERO console action should require more than 4 clicks.	3
DESTRIERO console should show meteorological and environmental information.	3
DESTRIERO console should show a map of devices and links status, updated in real time, to know the availability of devices in each time.	3
DESTRIERO console should show the recovery/reconstruction teams location.	3
DESTRIERO console should be accessible from remote locations including mobile devices.	3
DESTRIERO console should show resources location.	3
DESTRIERO should show the current status of its operation, should visualize how it works. It should also show in what step of the processing it currently is.	3
DESTRIERO console should be intuitive for operator.	3,5
DESTRIERO console should provide a shared situation awareness picture.	3,5
DESTRIERO console should allow map selection, distance measurements, zooming and scrolling.	4
DESTRIERO console should show geographical information.	4
DESTRIERO console should be very simple usage.	4

5.1.6 Hardware requirements

Possible answers	Median
DESTRIERO should work in common COTS hardware like Intel x86 based architectures computers.	2
DESTRIERO should use COTS networking hardware.	3
DESTRIERO, for handheld devices, should work in common architectures like Reduced Instruction Set Computer (RISC).	3

5.1.7 Ethical requirements

Possible answers	Median
DESTRIERO should meet EU regulations and national laws regarding sensitive data.	4
DESTRIERO should store sensitive data securely.	4

5.1.8 Collaborative work requirements

Possible answers	Median
DESTRIERO shows bound and automate work flows inside and between recovery and reconstruction agencies.	3
DESTRIERO should delimitate procedures intra and inter agencies to specify tasks.	3
DESTRIERO should boost collaborative work to enhance productivity.	3
DESTRIERO should enforce the collaborative work among members of different agencies.	3

5.2 Requirements gathered during the workshop

User requirements collected during the workshop are presented below. The importance status has been added by experts basing on the criteria from the questionnaire. However, it has been assumed that all end-users requirements gathered during workshops were important, thus "unimportant requirement" category has been removed. Moreover, "important" and "serious" categories have been merged into "serious". The final importance categories for end-user requirements collected during workshops is presented below.

- Wish requirement. Nice to have, but the system will be fully useful even without it.
- Serious requirement. Without this system will be usable but not useful gadget.
- Critical requirement. Without this system will be unusable at all.

The requirements have been presented in accordance with the Volere® methodology, and thus grouped into the following types: functional, non-functional and project constraints.

5.2.1 Requirements description template and interpretation

These requirements are described using the following table:

ID		Importance	
Name			
Type		Subtype	
Source	Paris Workshop 12 Dec 2013 / DESTRIERO questionnaire	Version	0.1
Description			
Comment			

Where:

1. **ID** is a symbolic unique identifier of the requirement. This field will be filled later.
2. **Name** is a brief textual name of the requirement.
3. **Importance** is the importance of the requirement to the DESTRIERO system. Such importance is described using the following scale:
    a. **Critical** – this requirement must be fully fulfilled, otherwise the system will be unusable or pointless.
    b. **Serious** – this requirement must be at least partially fulfilled, otherwise the usability of the system will be significantly reduced.
    c. **Wish-list** – this requirement can be fulfilled to bring additional value to the system, but without this requirement fulfilled the system will be fully usable.
4. **Type** and **subtype** are classification of the requirement in accordance to the Volere classification [28].
5. **Source** is the source of the requirement.
6. **Version** is the current version of the requirement.
7. **Description** is a longer textual description of the requirement.
8. **Comment** is additional information or explanation about the requirement if necessary.

5.2.2 Data sources and data processing

ID	END-USERS_req#001	Importance	Critical
Name	Conversion / harmonization / standardization		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall be able to adapt data from various sources into a common data format providing additional conversion information.		
Comment	For example all data shall be converted to use the same measure units (e.g. miles to kilometres), the same geographic coordinates system, the same IT data formats, etc.		

5.2.3 Classification and ontology

ID	END-USERS_req#002	Importance	Serious
Name	Changeable ontology		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	Any changes outside of the system should induce changes inside the system. The system should allow to modify the ontology used without recompilation and reinstallation of the system itself.		
Comment	Users of the system must be able to modify the ontology to keep it consistent with contemporary standards that may change in the future (e.g. definition of critical infrastructure).		

5.2.4 Data contents

ID	END-USERS_req#003	Importance	Wish-list
Name	Satellite images		
Type	Functional	Sub-type	Data
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system can provide satellite images in addition to the maps.		
Comment	For example the system should allow taking generating satellite images of a selected area.		

ID	END-USERS_req#004	Importance	Wish-list
Name	Objects damage scale		
Type	Functional	Sub-type	Data
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system must be able to distinguish between various degrees of damage of object or at least distinguish between heavily and lightly damage.		

Comment	For example the system should differentiate heavily damaged infrastructure, which cannot be used from the one that still could be used.

ID	END-USERS_req#005	Importance	Wish-list
Name	Temporal data versioning		
Type	Functional	Sub-type	Data
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system must be able to provide information of the given object or area after the disaster and before the total reconstruction.		
Comment	The system shall provide damage assessment reports and current operational status of critical infrastructure located in the area of disaster. For example the system must provide both the current condition of a bridge and simultaneously its condition before the disaster.		

ID	END-USERS_req#006	Importance	Wish-list
Name	Expendable resources		
Type	Functional	Sub-type	Data
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall provide information about the current level of expendable resources available in the disaster area.		
Comment	For example the system can provide information about amount of fuel currently stored in undamaged gas station located in the disaster area.		

ID	END-USERS_req#007	Importance	Wish-list
Name	Risk assessment		
Type	Functional	Sub-type	Data
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall offer data to the managers for estimating the current risk factor for critical infrastructure.		
Comment	For example the system shall estimate the risk of blackout in the disaster area due to current damage of power grid.		

5.2.5 Data presentation and user interface

ID	END-USERS_req#008	Importance	Critical
Name	GIS information		
Type	Non-functional	Sub-type	Look and feel
Source	Paris Workshop 12 Dec 2013	Version	0.1

Description	The system shall be able to present GIS-type information (e.g. maps, geographic localizations of important objects, etc.)
Comment	For example the system shall provide the localization of critical infrastructure, units etc. on the map.

ID	END-USERS_req#009	Importance	Critical
Name	Interactive maps		
Type	Non-functional	Sub-type	Look and feel
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall be able to present additional information about objects pointed on a map by users.		
Comment	The system shall present to the user additional information that concerns a particular object (e.g. type of object, level of damage, cost of reconstruction, reconstruction priority) - in a pop-up window. This shall be done by clicking on an object.		

ID	END-USERS_req#010	Importance	Critical
Name	Remote access		
Type	Non-functional	Sub-type	Look and feel
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall be able to be used from remote locations.		
Comment	For example the system shall offer the possibility of being used regardless of the user location.		

5.2.6 Communication

ID	END-USERS_req#011	Importance	Critical
Name	Communication platform		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall provide a common information sharing platform between various organizations involved in reconstruction.		
Comment	The information sharing is an important factor in the PDNA actions so it should be as effective as possible, especially when different organizations are involved.		

ID	END-USERS_req#012	Importance	Critical
Name	3rd party information		
Type	Functional	Sub-type	Functional

Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall allow organizations involved in reconstruction to upload additional data in the system.		
Comment	For example the system shall allow an organization to update damage status of a building according to the most recent observations made by personnel of the organization.		

ID	END-USERS_req#013	Importance	Critical
Name	Access rights		
Type	Non-functional	Sub-type	Security
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall allow organizations involved in reconstruction to define access rights for information they uploaded. Especially an organization must be able to define who may access its data.		
Comment	Some data needed for reconstruction may be sensitive or classified. Therefore without appropriate privilege management the system may be forbidden to be uses by law.		

ID	END-USERS_req#014	Importance	Critical
Name	IT Security		
Type	Non-functional	Sub-type	Security
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall provide adequate IT protection against data stealing and data forging.		
Comment	Some data needed for reconstruction may be sensitive or classified. Therefore without appropriate IT security level the system may be forbidden to be uses by law.		

ID	END-USERS_req#015	Importance	Serious
Name	3rd party activities		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall allow organizations involved in reconstruction to upload its current and planned activities in the disaster area.		
Comment	Knowledge what other organizations doing will be valuable for any organization involved in reconstruction and thus be significant added value to the system.		

ID	END-USERS_req#016	Importance	Wish-list

Name	3rd party conflicting activities		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall automatically detect conflicting or redundant activities undertaken by different organizations involved in reconstruction.		
Comment	For example the system shall warn that there is no point to rebuild a particular right now road because a new water pipeline is planned to be dig underground under it in the next week.		

It is important to note that all these requirements stated by the end users during the workshop have been included in the final list of requirements in its most corresponding section.

5.3 Remarks on end-user answers

It is important to note that as stated at the end of section 2.3 that all the results obtained in the previous section is the result of the analysis of 21 questionnaires filled in by external and internal project end users.

Most of the end-users have some experience in performing studies or trainings in the field of PDNA or RRP, but 44% of them indicated that their experience in this area is low or they have none. What is worth noticing, the greater part of the respondents' organizations have some collected lessons learnt from the past catastrophic events.

According to the respondents' opinion the analysis tool and the information system are the two most important technical capabilities necessary to PDNA/RRP. It is important to note that each of the pre-defined answers (technical resources, devices, sensors) is a serious or an important requirement for the majority of respondents. Although, respondents pointed out that the organizational and individual capabilities (especially, human resources, cooperation, knowledge and mentality) are more important for them than the technical capabilities.

More than 63% of respondents have no collaborative work system within organization that keeps track of which capabilities or resources are currently available for PDNA/RRP. Most of them (about 76%) also do not use collaborative work tools for this purpose.

However, almost 79% of respondents have field collaborative experience with other organizations and more than 73% of them declared that some of these organizations were from another country. According to respondents' opinion, the procedures (29%), communication channel (27%) and data format (24%) are the major issues regarding national and international cooperation. For 20% of them a language is also a problem.

End-users expressed the opinion that the crucial information sources for PDNA/RRP decision-making are: human, professional and written sources. Channels for alerting can also be useful. Summarizing, respondents are more likely to trust experts or mass media than information from social networks (non-professional information sources; median: 1).

Before the catastrophe, respondents would like to have information about: training, location, scientific researches, intelligence and emergencies. Similarly to previous question, they do not think that society observations are important.

Most of end-users pointed out, that during the emergency management phase they would need all the pre-defined, in the survey, information, with the most important being: type of the catastrophe and teams on the field (both of them have median 4).

For end-users, after the emergency management phase, the most important areas are: information exchange and the decision-makers information.

Main challenges have been isolated in the decision making process. According to the survey analysis from the first group (the political and organizational challenges), except limited equipment and human resources, money, tools, all other are serious challenges. From the group of "situation awareness challenges" only usage of open sources and public information is not really important for the respondents.

One of the parts of the survey was about requirements for PDNA/RRP system divided by seven types: the general requirements, the database and storage requirements, the communication requirements, the HMI requirements, the hardware requirements, the ethical requirements and collaborative work requirements. This part of the report will present only the most and the least important requirements. The full list of requirements, which DESTRIERO system should fulfil, is in the section 5.

End-users pointed out, that DESTRIERO should offer simple interfaces to share data with external organizations and be easily deployable and simple to dismantle. Generally speaking, respondents, most of all appreciate: intuitiveness, scalability, modularity and flexibility of the system. System should also produce situation awareness of the whole area and support a wide variety of recovery (reconstruction) situation. It should integrate different types of sensors, including mobile ones. Allowing messaging capabilities *from* or *to* the nodes in the hot-spot and integrating information flows from satellite devices like SAR for Earth resources visualization are also important requirements. Moreover, end-users would like to use DESTRIERO outdoor, which indicates that mobile devices should be weatherproof. According to their opinions, the least important functionalities are feeding DSS system by sensors measurements (median 2) and visibility of sensors data.

Based on respondents' view about database and storage requirements, DESTRIERO users should be able to access stored data easily. Moreover, storing all data gathered during a recovery situation cannot be ignored. In the security subject, end-users expressed opinion that access to the stored data should be done by means of an authentication process and only authorized users should have access to the DESTRIERO data. Although, system should provide means to use stored data for a post crisis retrospection of what happened.

Regarding requirements from the communication section end-users pointed to reliable communication, working offline when communication is lost and (what is similar to previous) working even if catastrophe would destroy existing communications structure as being the most important features of the system. System should also: allow the integration, as far as possible, with existing legacy systems and coexist with the existing communication without affecting them.

Based on the answers from HMI section, DESTRIERO console should in the first place: be very simple to use, show geographical information and allow map selection, distance measurements, zooming and scrolling, provide a shared situation awareness picture and be intuitive for the operator. On the other hand, it is not really important for end-users to support usage on touchable screens and to show DSS inputs, management and results (median 2).

However, using COTS networking hardware in DESTRIERO and working in common architectures (for handheld devices) like Reduced Instruction Set Computer (RISC) have (the same) median – 3.

Respondents expressed an opinion, that system should guarantee storing sensitive data securely and should respect EU regulations and national laws in this area. DESTRIERO should also enforce the collaborative work among members of different agencies.

During the workshop with end-users they also expressed opinion about some additional requirements.

During the first stage of the PDNA, end-users would like to have information about what have to be done (priority assessment) and secure perimeter maintenance. It has also been said that DESTRIERO system should give users information about damaged area – where it is, what the level of the damage is and what kind of equipment (units/machines) they would need. As a consequence, there is also a need to know what kind of information the reconstruction units will get.

Considering the presentation of data, experts indicated that information should be presented graphically, because it is easier to look at a map and see some points than read coordinates. The map should also present the most important infrastructure of the region (hospitals, fuel stations, bridges, power stations, etc.) combined with information whether it is working or not. Each icon on the map should provide, the most up-to-date information on the resource represented.

Participants of the workshop also identified the possible problem with defining *critical infrastructure*, because there are different definitions which vary across countries. They also underlined the importance of having risk assessment plans. DESTRIERO system should provide information whether there is a risk assessment plan for a particular region or not. Furthermore, there could be a problem with sharing information – some data could be very sensitive and thus some organizations may be unwilling to share it. In the face of critical importance of data fusion during the damage assessment, it could be a substantial problem.

End-users pointed out that some recovery procedures require politicians' decisions as people responsible for crisis-management, deciding which resources could be used.

It has also been mentioned that it would be good to have information about possible risks that could happen in the future (in the particular region).

Summarizing, the DESTRIERO system should facilitate communication on higher level of activities coordination. Many different agencies involved in the reconstruction processes should be asked about their particular needs. There has also been the suggestion of inviting other agencies from various organizational levels to the group of end-users and asking them about their particular needs. Finally, system should provide different databases (e.g. localization of hospitals, fresh water sources, etc.) and information about the localization of units that could be used for reconstruction.

6 Formalization and prioritization of collected user requirements

In this chapter, all the requirements, both from questionnaires and workshops, have been collected and merged. In case when there were two requirements (one from questionnaire and one from workshop) referring to the same matter, they were merged in a way that the requirement name has been adapted from the questionnaire requirement and additional comment has been added when needed (basing on information collected from workshops).

For the purpose of formalizing and prioritizing the requirements the median has been used. It has been agreed by experts that requirements of category 2 and 3, from the questionnaires, will be merged into "Serious" category, as they cover the same set of requirements. Furthermore, requirements from category 1 fall into requirements of median 2 – "wish-list". To evaluate the requirements from questionnaires, the following criteria have been applied:

Median	Importance
4	Critical
3	Serious
2	Wish-list

6.1 Formalized user requirements

The complete and final list of end-users requirements is presented below.

6.1.1 General requirements

ID	GENERAL_req#001	Importance	Critical
Name	Interface		
Type	Functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall offer simple interfaces to share data with external organizations.		
Comment	For example the system shall have clear and intuitive interface so that data exchange could fast and convenient.		

ID	GENERAL_req#002	Importance	Critical
Name	Deployment		
Type	Non-functional	Sub-type	Maintainability and Portability
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall be easily deployable and simple to dismantle.		
Comment	The time needed to set-up and dismantle the system shall be as short as possible, as in some cases it may be crucial.		

ID	GENERAL_req#003	Importance	Critical
Name	Situation awareness		
Type	Functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall produce a situation awareness of the whole area.		
Comment	The system shall effectively obtain information, analysis it and present comprehensive view of a situation.		

ID	GENERAL_req#004	Importance	Serious
Name	Recovery/reconstruction support		
Type	Functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall support a wide variety of recovery/reconstruction situations.		
Comment	For example the system shall provide, adequate for a given situation information, to support recovery and reconstruction actions.		

ID	GENERAL_req#005	Importance	Critical
Name	Scalability, modularity and flexibility		
Type	Non-functional	Sub-type	Usability
Source	DESTRIERO questionnaire	Version	0.1
Description	DESTRIERO system shall be scalable, modular and flexible.		
Comment	The system shall be optimized for the space, power and weight.		

ID	GENERAL_req#006	Importance	Serious
Name	Integration with other devices		
Type	Constraint	Sub-type	-
Source	DESTRIERO questionnaire	Version	0.1
Description	DESTRIERO shall integrate different types of sensors, including mobile ones.		
Comment	Information from multiple sources is more reliable.		

ID	GENERAL_req#007	Importance	Serious
Name	Messaging		
Type	Functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall allow messaging capabilities from/to nodes in the hot-spot.		
Comment	Information exchange is a top priority for end-users.		

ID	GENERAL_req#008	Importance	Serious
Name	Satellite communication		
Type	Constraint	Sub-type	-
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall integrate information flows from satellite devices like SAR for Earth resources visualization.		
Comment	The system shall facilitate satellite communication for better situation awareness.		

ID	GENERAL_req#009	Importance	Critical
Name	Weather resistant		
Type	Non-functional	Sub-type	Operational
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall be outdoor and mobile devices should be weatherproof.		
Comment	No weather conditions shall affect the proper functioning of the system.		

ID	GENERAL_req#010	Importance	Wish-list
Name	Support		
Type	Functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall provide the emergency procedures and protocols to apply in a recovery/reconstruction situations.		
Comment	Collection of emergency procedures and protocols shall be available for recovery/reconstruction teams.		

ID	GENERAL_req#011	Importance	Serious
Name	Integration		
Type	Non-functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall allow the easy integration of unattended sensors.		
Comment	All external sensors shall be easily connected to the system.		

ID	GENERAL_req#012	Importance	Serious
Name	CBRN		
Type	Constraint	Sub-type	-
Source	DESTRIERO questionnaire	Version	0.1

Description	The system shall incorporate CBRN sensors.
Comment	One of the system features shall include CBRB sensor support.

ID	GENERAL_req#013	Importance	Serious
Name	Data sharing		
Type	Functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	The system sensors data shall be shared over DESTRIERO Infrastructure.		
Comment	Data sharing and information exchange is crucial.		

ID	GENERAL_req#014	Importance	Wish - list
Name	DSS feed		
Type	Functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	The system sensor measurements shall feed DSS system.		
Comment	All information collected from sensors shall be processed by DSS system.		

ID	GENERAL_req#015	Importance	Critical
Name	Data fusion		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system must be able to adapt data from various sources into a common data format providing additional conversion information.		
Comment	For example all data must be converted to use the same measure units (e.g. miles to kilometers), the same geographic coordinates system, the same IT data formats, etc.		

ID	GENERAL_req#016	Importance	Serious
Name	Changeable ontology		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	Any changes outside of the system shall induce changes inside the system. The system shall allow modifying the ontology used without recompilation and reinstallation of the system itself.		
Comment	Users of the system must be able to modify the ontology to keep it consistent with contemporary standards that may change in the future (e.g. definition of critical infrastructure).		

ID	GENERAL_req#017	Importance	Wish-list
Name	Objects damage scale		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system must be able to distinguish between various degrees of damage of object or at least distinguish between heavily and lightly damage.		
Comment	For example the system shall differentiate heavily damaged infrastructure, which cannot be used from the one that still could be used.		

ID	GENERAL_req#018	Importance	Wish-list
Name	Risk assessment		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system may estimate the current risk factor for critical infrastructure.		
Comment	For example the system may estimate the risk of blackout in the disaster area due to current damage of power grid.		

ID	GENERAL_req#019	Importance	Critical
Name	Arbitrary reconstruction decisions		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system cannot prioritize the order of reconstruction of particular objects.		
Comment	In real world the prioritization of reconstruction depends on many factors that cannot be modelled in computer system (e.g. political decisions, changes or improvements of infrastructure during reconstruction, etc.). Therefore the system must not interfere in such decisions. It may only store the priorities for reconstruction of each object with. The decision shall be left to operators.		

6.1.2 Database and storage requirements

ID	DATABASE_req#001	Importance	Critical
Name	Accessibility		
Type	Non-functional	Sub-type	Usability
Source	DESTRIERO questionnaire	Version	0.1
Description	The system users shall be able to access stored data easily.		
Comment	The access to information shall be as user-friendly as possible.		

ID	DATABASE_req#002	Importance	Serious
Name	Data storage		
Type	Functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall store all data gathered during a recovery/reconstruction situations.		
Comment	Collection of all data is crucial regarding the recovery/reconstruction actions.		

ID	DATABASE_req#003	Importance	Critical
Name	User authorization		
Type	Non-functional	Sub-type	Security
Source	DESTRIERO questionnaire	Version	0.1
Description	Only authorized DESTRIERO users shall access to the DESTRIERO data.		
Comment	For example, no third parties shall be able access DESTRIERO without authorization.		

ID	DATABASE_req#004	Importance	Critical
Name	User authentication process		
Type	Functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	Access to stored data shall be done by means of an authentication process.		
Comment	Authorization and authentication processes shall be performed to all user attempting access to the DESTRIERO.		

ID	DATABASE_req#005	Importance	Serious
Name	Timeline data presentation		
Type	Functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall provide means to use stored data for a post crisis playback of what happened.		
Comment	A timeline of events shall be available to recovery/reconstruction teams.		

ID	DATABASE_req#006	Importance	Wish-list
Name	Various database integration		
Type	Constraint	Sub-type	-
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall be capable of using and/or integrating with existing legacy databases.		
Comment	The system shall present information from various sources.		

ID	DATABASE_req#007	Importance	Serious
Name	Data storage and management standards		
Type	Non-functional	Sub-type	Operational
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall use existing standards for data storage and management.		
Comment	No new standards for data storage and management shall be used.		

ID	DATABASE_req#008	Importance	Wish-list
Name	Data extrapolation		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system may provide prediction of the future state of objects based on immediate extrapolation of their current state.		
Comment	For example the system may estimate the expected time of failure of mobile telephony base stations due to depletion of their auxiliary power sources.		

6.1.3 Communication requirements

ID	COMMUNICATION_req#001	Importance	Critical
Name	Reliability		
Type	Non-functional	Sub-type	Performance
Source	DESTRIERO questionnaire	Version	0.1
Description	DESTRIERO communication shall be reliable.		
Comment	All communication shall be safe and stable.		

ID	COMMUNICATION_req#002	Importance	Critical
Name	Offline operation		
Type	Non-functional	Sub-type	Performance
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall work offline when communications are lost.		

Comment	In case of connection loss the system shall remain active.

ID	COMMUNICATION_req#003	Importance	Critical
Name	Seamless operation		
Type	Non-functional	Sub-type	Performance
Source	DESTRIERO questionnaire	Version	0.1
Description	The system communication shall work, partially, even if a catastrophe destroys existing communications infrastructure.		
Comment	The system shall operate seamlessly, even in case of partial infrastructure loss.		

ID	COMMUNICATION_req#004	Importance	Critical
Name	Interoperability		
Type	Non-functional	Sub-type	Performance
Source	DESTRIERO questionnaire	Version	0.1
Description	The system communications shall allow interoperability (hardware, software and of procedures) among systems of different agencies and nations.		
Comment	The system design shall facilitate various hardware/software support.		

ID	COMMUNICATION_req#005	Importance	Serious
Name	Communication channels		
Type	Functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall include mechanisms for ensuring its communications channels.		
Comment	Unified communication channels would ensure better cooperation.		

ID	COMMUNICATION_req#006	Importance	Critical
Name	Coexistence with communications		
Type	Functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	DESTRIERO communications shall coexist with the existing communications without affecting them.		
Comment	There shall be no interferences between communication channels.		

ID	COMMUNICATION_req#007	Importance	Serious
Name	Data prioritization		
Type	Functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	The system communications shall allow prioritization of data flows and of procedures.		
Comment	Priority assignment shall be allowed in DESTRIERO.		

ID	COMMUNICATION_req#008	Importance	Serious
Name	Seamless communications		
Type	Functional	Sub-type	Functional
Source	DESTRIERO questionnaire	Version	0.1
Description	DESTRIERO communications technologies shall be seamless to its users.		
Comment	The system communication shall work seamlessly, even in case of partial infrastructure loss.		

ID	COMMUNICATION_req#009	Importance	Serious
Name	System integration		
Type	Constraint	Sub-type	-
Source	DESTRIERO questionnaire	Version	0.1
Description	The system communications shall allow the integration, as far as possible, with existing legacy systems.		
Comment	It shall be possible to integrate DESTRIERO with already existing systems.		

ID	COMMUNICATION_req#010	Importance	Serious
Name	Communication standards		
Type	Non-functional	Sub-type	Performance
Source	DESTRIERO questionnaire	Version	0.1
Description	The system communications shall rely on standards.		
Comment	It includes standard Commercial Off-The-Shelf (COTS) hardware as well as standards for protocols.		

ID	COMMUNICATION_req#011	Importance	Critical
Name	Communication platform		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall provide a common communication platform between various organizations involved in reconstruction.		
Comment	The communication is an important factor in the PDNA actions so it shall be as effective as possible, especially when different organizations are involved.		

ID	COMMUNICATION_req#012	Importance	Critical
Name	High level management communication		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system is intended to be used on a quite high level of management of organizations involved in reconstruction process.		
Comment	Therefore, the system shall provide "a wide picture" of the disaster and shall not dig into detailed in-field procedures of various services and organization.		

ID	COMMUNICATION_req#013	Importance	Critical
Name	3rd party information		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall allow organizations involved in reconstruction to upload data in the system.		
Comment	For example the system shall allow an organization to update damage status of a building according to the most recent observations made by personnel of the organization.		

ID	COMMUNICATION_req#014	Importance	Critical
Name	Access rights		
Type	Non-functional	Sub-type	Security
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall allow organizations involved in reconstruction to define access rights for information they uploaded. Especially an organization must be able to define who may access its data.		
Comment	Some data needed for reconstruction may be sensitive or classified. Therefore without appropriate privilege management the system may be forbidden to be uses by law.		

ID	COMMUNICATION_req#015	Importance	Serious
Name	3rd party activities		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall allow organizations involved in reconstruction to upload its current and planned activities in the disaster area.		
Comment	Knowledge what other organizations doing will be valuable for any organization involved in reconstruction and thus be significant added value to the system.		

ID	COMMUNICATION_req#016	Importance	Wish-list
Name	3rd party conflicting activities		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system may automatically detect conflicting or redundant activities undertaken by different organizations involved in reconstruction.		
Comment	For example the system may warn that there is no point to rebuild a particular right now road because a new water pipeline is planned to be dig underground under it in the next week.		

ID	COMMUNICATION_req#017	Importance	Critical
Name	IT Security		
Type	Non-functional	Sub-type	Security
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall provide adequate IT protection against data stealing and data forging.		
Comment	Some data needed for reconstruction may be sensitive or classified. Therefore without appropriate IT security level the system may be forbidden to be uses by law.		

6.1.4 HMI requirements

ID	HMI_req#001	Importance	Critical
Name	User-friendly		
Type	Non-functional	Sub-type	Look and feel
Source	DESTRIERO questionnaire	Version	0.1
Description	DESTRIERO console shall be very simple to use and intuitive.		
Comment	The interface shall be designed in such a way that users could use it without much training.		

ID	HMI_req#002	Importance	Critical
Name	GIS information		
Type	Non-functional	Sub-type	Look and feel
Source	DESTRIERO questionnaire/ Paris Workshop 12 Dec 2013	Version	0.1
Description	DESTRIERO console shall show geographical information.		
Comment	The system shall be able to present GIS-type information (e.g. maps, geographic localizations of important objects, etc.) and other geographical information.		

ID	HMI_req#003	Importance	Critical
Name	Situation awareness		
Type	Non-functional	Sub-type	Look and feel
Source	DESTRIERO questionnaire	Version	0.1
Description	The system console shall provide a shared situation awareness picture.		
Comment	Therefore the system shall provide "a wide picture" of the disaster and shall not dig into detailed in-field procedures of various services and organization.		

ID	HMI_req#004	Importance	Serious
Name	Up-to-date operation status		
Type	Non-functional	Sub-type	Look and feel
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall show the current status of its operation.		
Comment	For example it shall visualize the current status of its operation and present next steps.		

ID	HMI_req#005	Importance	Critical
Name	Map actions		
Type	Non-functional	Sub-type	Look and feel
Source	DESTRIERO questionnaire	Version	0.1
Description	The system console shall allow map selection, distance measurements, zooming and scrolling.		
Comment	The system shall allow user to fully interfere in maps (e.g. select a map, zoom it, add pin-points etc.)		

ID	HMI_req#006	Importance	Serious
Name	Resource localization		
Type	Non-functional	Sub-type	Look and feel
Source	DESTRIERO questionnaire	Version	0.1
Description	The system console shall show resources location.		
Comment	Basing on the input from various teams it shall show the current location of resources.		

ID	HMI_req#007	Importance	Serious
Name	Teams localization		
Type	Non-functional	Sub-type	Look and feel
Source	DESTRIERO questionnaire	Version	0.1
Description	DESTRIERO console shall show the recovery/reconstruction teams location.		
Comment	Basing on the input from various teams it shall show the current location of recovery/reconstruction teams.		

ID	HMI_req#008	Importance	Serious
Name	Remote access		
Type	Constraint	Sub-type	-
Source	DESTRIERO questionnaire / Paris Workshop 12 Dec 2013	Version	0.1
Description	DESTRIERO console shall be accessible from remote locations including mobile devices.		
Comment	For example the system shall offer the possibility of being used regardless of the user location.		

ID	HMI_req#009	Importance	Serious
Name	Meteorological and environmental information		
Type	Non-functional	Sub-type	Look and feel
Source	DESTRIERO questionnaire	Version	0.1
Description	The system console shall show meteorological and environmental information from different providers.		
Comment	For example, users shall have access to information from weather forecasts.		

ID	HMI_req#010	Importance	Serious
Name	Real-time maps update		
Type	Non-functional	Sub-type	Look and feel
Source	DESTRIERO questionnaire	Version	0.1
Description	DESTRIERO console shall show a map of devices and links status, updated in real time, to know the availability of devices in each time.		
Comment	The end-users shall be able to see the up-to-date map with localization of available devices.		

ID	HMI_req#011	Importance	Serious
Name	Quick information access		
Type	Constraint	Sub-type	-
Source	DESTRIERO questionnaire	Version	0.1
Description	No DESTRIERO console action shall require more than 4 clicks.		
Comment	All important actions (e.g. checking units status, weather conditions) in DSETRIERO shall be done within approx. 4 clicks.		

ID	HMI_req#012	Importance	Wish-list
Name	DSS support		
Type	Non-functional	Sub-type	Look and feel
Source	DESTRIERO questionnaire	Version	0.1
Description	DESTRIERO console shall show Decision Support System (DSS) inputs, management and results.		
Comment	All information collected from sensors shall be processed by DSS system.		

ID	HMI_req#013	Importance	Wish-list
Name	Touch screen support		
Type	Non-functional	Sub-type	Look and feel
Source	DESTRIERO questionnaire	Version	0.1
Description	The system console action shall permit usage on touchable screens.		
Comment	Touch screens would be very useful in case of, for example, interactive maps.		

ID	HMI_req#014	Importance	Wish-list
Name	Satellite images		
Type	Non-functional	Sub-type	Look and feel
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall provide satellite images in addition to the maps.		
Comment	The end-users shall be able to retrieve satellite images upon request to get the most updated situation status.		

ID	HMI_req#015	Importance	Critical
Name	Objects statuses		
Type	Non-functional	Sub-type	Look and feel
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system must be able to provide information of the current status of important objects located in the area of disaster.		
Comment	For example the system must provide damage assessment reports and current operational status of critical infrastructure located in the area of disaster.		

ID	HMI_req#016	Importance	Critical
Name	Interactive maps		
Type	Non-functional	Sub-type	Look and feel
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall be able to present additional information about objects pointed on a map by users.		
Comment	The system shall present to the user additional information that concerns a particular object (e.g. type of object, level of damage, cost of reconstruction, reconstruction priority) - in a pop-up window. This shall be done by clicking on an object.		

ID	HMI_req#017	Importance	Serious
Name	Temporal data versioning		
Type	Functional	Sub-type	Functional
Description	The system shall be able to provide information of the given object or area after the disaster and before the total reconstruction.		
Comment	The system shall provide damage assessment reports and current operational status of critical infrastructure located in the area of disaster. For example the system shall provide both the current condition of a bridge and simultaneously its condition before the disaster.		

ID	HMI_req#018	Importance	Critical
Name	Graphical user interface		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall provide graphical user interface.		
Comment	User interface is need to allow users interact with the system.		

ID	HMI_req#019	Importance	Wish-list
Name	Expendable resources		
Type	Functional	Sub-type	Functional
Source	Paris Workshop 12 Dec 2013	Version	0.1
Description	The system shall provide information about the current level of expendable resources available in the disaster area.		
Comment	For example the system shall provide information about amount of fuel currently stored in undamaged gas station located in the disaster area.		

6.1.5 Hardware requirements

ID	HARDWARE_req#001	Importance	Wish-list
Name	COTS networking hardware		
Type	Constraints	Sub-type	-
Source	DESTRIERO questionnaire	Version	0.1
Description	DESTRIERO shall use COTS networking hardware.		
Comment	Commercially available hardware shall be used in DESTRIERO.		

ID	HARDWARE_req#002	Importance	Serious
Name	RISC support		
Type	Constraints	Sub-type	-
Source	DESTRIERO questionnaire	Version	0.1
Description	The system, for handheld devices, shall work in common architectures like Reduced Instruction Set Computer (RISC).		
Comment	Handheld device system shall be based on RISC architecture.		

ID	HARDWARE_req#003	Importance	Serious
Name	COTS hardware		
Type	Constraints	Sub-type	-
Source	DESTRIERO questionnaire	Version	0.1

Description	The system shall work in common COTS hardware like Intel x86 based architectures computers.
Comment	Commercially available hardware shall be used in DESTRIERO.

6.1.6 Ethical requirements

ID	ETHICAL_req#001	Importance	Critical
Name	Secure data storage		
Type	Non-functional	Sub-type	Legal
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall store sensitive data securely.		
Comment	DESTRIERO shall ensure that all critical and sensitive data are secure and no unauthorized user could have access to it.		

ID	ETHICAL_req#002	Importance	Critical
Name	EU regulations compliance		
Type	Non-functional	Sub-type	Legal
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall meet EU regulations and national laws regarding sensitive data.		
Comment	The system shall not violate any EU regulations.		

6.1.7 Collaborative work requirements

ID	COLLABORATIVE_req#001	Importance	Serious
Name	Collaboration		
Type	Non-functional	Sub-type	Cultural and Political
Source	DESTRIERO questionnaire	Version	0.1
Description	DESTRIERO shall enforce the collaborative work among members of different agencies		
Comment	Cooperation of various entities is crucial in recovery/reconstruction actions, thus the system shall ensure effective collaboration.		

ID	COLLABORATIVE_req#002	Importance	Serious
Name	Productivity		
Type	Non-functional	Sub-type	Performance
Source	DESTRIERO questionnaire	Version	0.1
Description	DESTRIERO shall boost collaborative work to enhance productivity.		
Comment	To ensure high productivity effective collaboration is required; DESTRIERO shall facilitate this.		

ID	COLLABORATIVE_req#003	Importance	Serious
Name	Procedures interoperability		
Type	Non-functional	Sub-type	Operational
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall support the interlinkage procedures of different agencies for specific tasks.		
Comment	Different agencies have to use different procedures in different situations; in order to make their work effective, DESTRIERO shall allow interlinking different procedures (functions).		

ID	COLLABORATIVE_req#004	Importance	Serious
Name	Intra agencies work flow		
Type	Non-functional	Sub-type	Operational
Source	DESTRIERO questionnaire	Version	0.1
Description	The system shall shows bound and automate work flows inside and between recovery and reconstruction agencies.		
Comment	The data flow between agencies shall be automated and secure.		

7 Requirements traceability matrix

In order to track user requirements during the DESTRIERO system development, traceability matrix will be prepared. Such procedure would allow ensuring that all required requirements are included in the system and are complete in relation to the Description of Work (DoW) document. The matrix will allow determining the status of user requirement – depending on the month of project's realization it could be checked which Work Package (WP) is currently worked on and which requirements are being realized.

The Table 1 below shows an example of user requirements mapping on different work packages. The allocation of requirements to different WPs in this table is arbitrary and with the unique purpose of show how the requirements can be traced through this kind of matrix. The real traceability matrix will be performed in task 2.5 and will be modified during the project life cycle.

Table 1 - Example of user requirements tracking

Requirement ID	WP2	WP3	WP4	WP5	WP6	STATUS
GENERAL_req#002					X	Done
GENERAL_req#005		X				Pending
GENERAL_req#013			X			Done
DATABASE_req#001		X				Done
DATABASE_req#006		X				Done
COMMUNICATION_req#001				X		Pending
COMMUNICATION_req#010		X				Pending
COMMUNICATION_req#012				X		Pending
HMI_req#004					X	Done
HMI_req#020				X		Done
HARDWARE_req#002				X		Done
HARDWARE_req#003				X		Pending
ETHICAL_req#001					X	Done
ETHICAL_req#002	X					Pending
COLLABORATIVE_req#003			X			Done

Results of task 2.2: Collaborative working needs

8 Collaboration in the context of humanitarian aid

In recent years the number of man-made and natural disasters has risen as well as the number of non-governmental organizations (NGOs) engaged in international humanitarian relief and development [10] [22]. This growth has in part contributed to their increasing importance in the humanitarian field but at the same time has increased the range of challenges they face. These challenges are not limited to NGOs alone, in fact all relief organizations (Governmental Organizations, International Organizations, etc.) have to deal with these. One of the challenges is inter-organizational coordination with respect to information technology [19].

8.1 Definition of collaboration

There are many similar terms used in the context of inter- and intra-organizational collaboration in crisis management. We will focus on coordination between organizations (inter-organizational), which is more than just cooperation (knowing about each other) and less than collaboration (working together on the field in the same tasks) (see Figure 5). Each **X** in Figure 5 represents a specific task embedded in a particular domain (represented by the clouds).

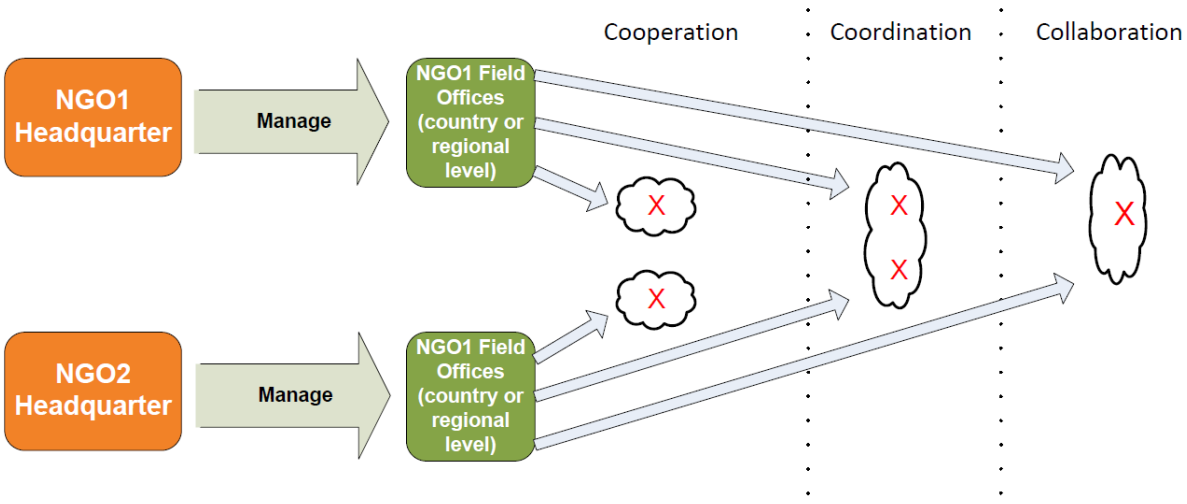

Figure 5 – Cooperation, coordination and collaboration between NGOs [19]

[19] provides the following definition of coordination: "Coordination is more formal than cooperation. It can be considered as a step toward further and more enhanced cooperation. It takes place when organizations find that their individual goals are similar, so they can work together on 'their separate, yet compatible, missions' (Czajkowski, 2007, p. 2)."

Another definition is provided by [2]: "Coordination is a process, the orchestration of effort toward appropriate, effective, efficient and coherent delivery of humanitarian services. It involves the systematic use of policy instruments including:

- providing leadership and management of representative bodies
- negotiating and maintaining a serviceable framework with host political authorities
- orchestrating a functional division of labour (including civil–military)
- strategic planning
- mobilizing resources for integrated programming
- gathering data and managing information
- ensuring accountability (including accountability to recipient populations)
- providing a focus for joint advocacy."

[2] also mentions that even when most dictionaries define coordination simply as the act of working together harmoniously, in development literature, coordination assumes interdependencies, the necessity to manage it and a degree of hierarchy.

Inter-organizational coordination between international humanitarian NGOs will seek to share information, resources and responsibilities. In that way more efficient use of resources and minimization of duplicate activities will provide effective and timely assistance to those in need [11]. This coordination can occur at multiple levels (see chapter 8.2) and may be carried out through one of several forms, including command, consensus or default.

The coordination needs in the context of recovery and reconstruction are high-level exemplified in relation to respectively following the steps of the recovery planning and implementation process (see Figure 6). The diagram illustrates the planning and implementation process in a post-conflict (post-disaster) setting over an eighteen month period. In reality, however, it is much harder to set a firm line for early recovery, and the period from launch to closure of early recovery processes will always be heavily context specific [5].

Coordination plays a crucial role during the whole process, first to align the parallel activity streams (coordinating mechanism, assessments, strategic planning, funding mechanisms, and programming) in time and order. And secondly all stakeholders inside the different streams must be organized to ensure the most effective and efficient allocation of the limited resources. Efficient coordination of the stakeholders can be achieved by sharing information and promoting integration to avoid duplication and gaps [5].

According to [19] crucial issues for information management in humanitarian coordination are:

- Standardization (e.g. standards for information, standards for the interoperability of systems, and standards of worker skill sets).
- Capacity building (incl. technological and human capacities).
- Information availability and analysis (e.g. timely and accurate information, effective information collection, compiling and dissemination).

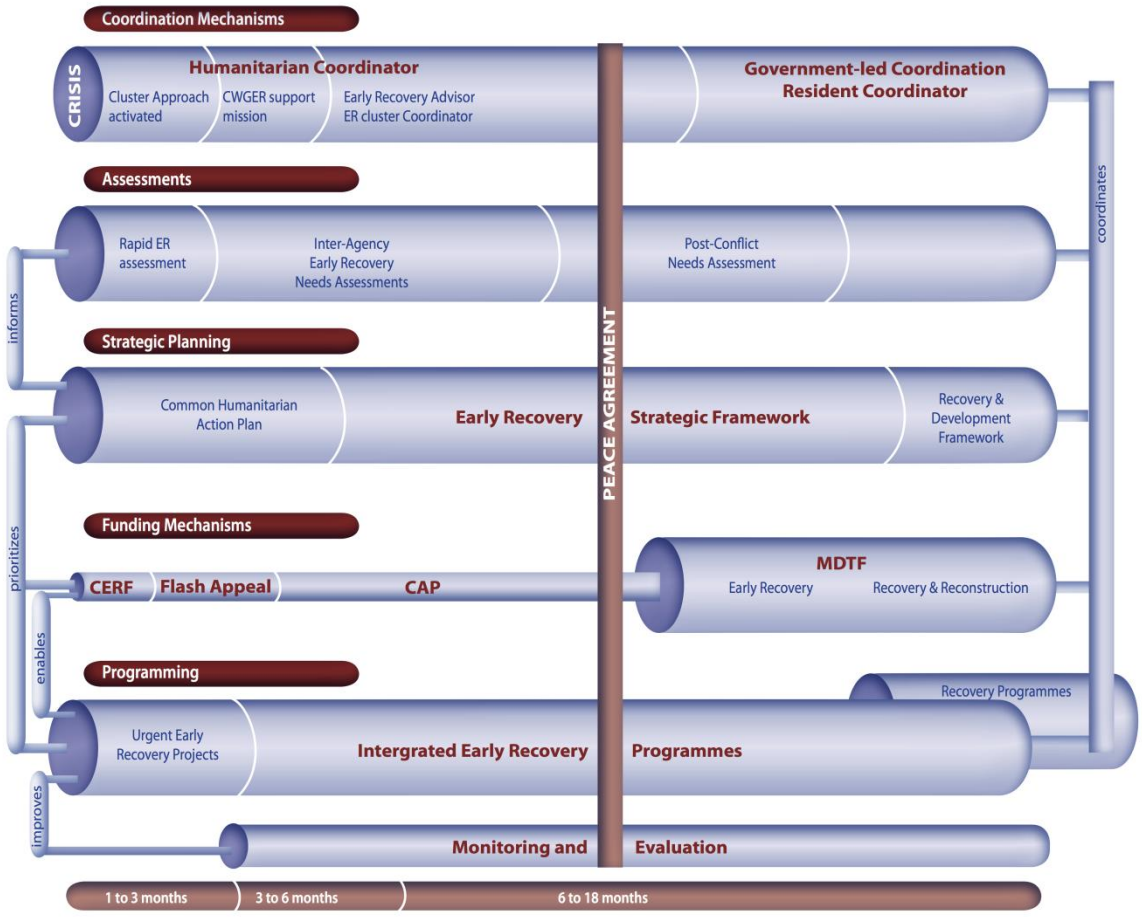

Figure 6 – Collaboration is an integral part of early recovery [5]

[20] summarizes eight coordination barriers that affect the inter-organizational coordination (see Table 2). The list points out that most of the barriers are non-technical and thus cannot be addressed and solved only with information systems.

Table 2 – Eight coordination barriers [20]

Barriers	**Issues**
Bureaucratic and turf protection	Desire to maintain autonomy and thus avoid having individuals in other organizations interfere within one's own organization.
Divergent goals and conflict interests	Divergent goal or an over-emphasis on individual organizational goals.
Resource dependency	Interdependencies require coordination but at the same time they can create problems for coordination and hamper performance.
Coordination cost	Scare resources have to be invested in maintenance of relationships with other organizations.

Barriers	Issues
Information and communication issues	Information availability and accessibility; information quality; information sharing; information system quality; standards and interoperability; systems integration.
Assessing and planning joint activities	Disagreement about the means and the ends of a coordinated activity.
Competition for resources	Competition for scarce resources may inhibit the initiation of inter-organizational coordination.
Emergency response time	Coordination is often perceived as increasing response time especially in case of emergency.

8.2 Levels of collaboration (inter-/intra-organizational)

There is a diversity of actors involved in the recovery and reconstruction activities, with a broad variety of information demands and decision responsibilities as shown in Figure 7. Each of these groups (e.g. NGOs) might be very diverse in terms of size, agenda, tasks, language, skills, budget, staff etc. This leads to the fact that collaboration between actors must be understood as unique even when the actors belong to the same group.

Besides the NGOs you can differentiate the following groups of actors: military, international organizations, private sector, donors, public sector, media, and individuals. You have to be aware that even if these groups are not so-called NGOs this does not imply that these have to be governmental e.g. donors can be public or private.

Figure 7 – Decision makers in the field of humanitarian relief (based on [25])

For clarity of presentation only the first three hierarchy levels of each group are shown in Figure 7. Actual most groups have five or even more internal levels that can be differentiated. The collaboration of these levels inside one particular group (e.g. a NGO) is defined as intra-organizational collaboration. This kind of collaboration is not the main focus of the project.

Instead the project will focus on the collaboration needs between organizations (inter-organizational) specifically between NGOs. The extent of inter-organizational collaboration can be huge. For example even two years after the Haiti earthquake in 2010 UNOCHA lists over 800 organizations in their contact directory [24], including over 400 health partners that help providing ongoing services in the health cluster [27].

8.3 Collaboration during the phases of reconstruction and ongoing transition

Several phases can be separated analytically to understand the tasks and information challenges in recovery and reconstruction and how they are interrelated with other tasks. The classical conceptual framework is a cycle (see Figure 8). The cycle consists of a succession of clearly distinct phases from prevention to preparedness, relief (or response), (early) recovery, and reconstruction. Over the years this cycle has been replaced by a continuum of activities and phases managed by the humanitarian community and development organizations [1] (compare Figure 9).

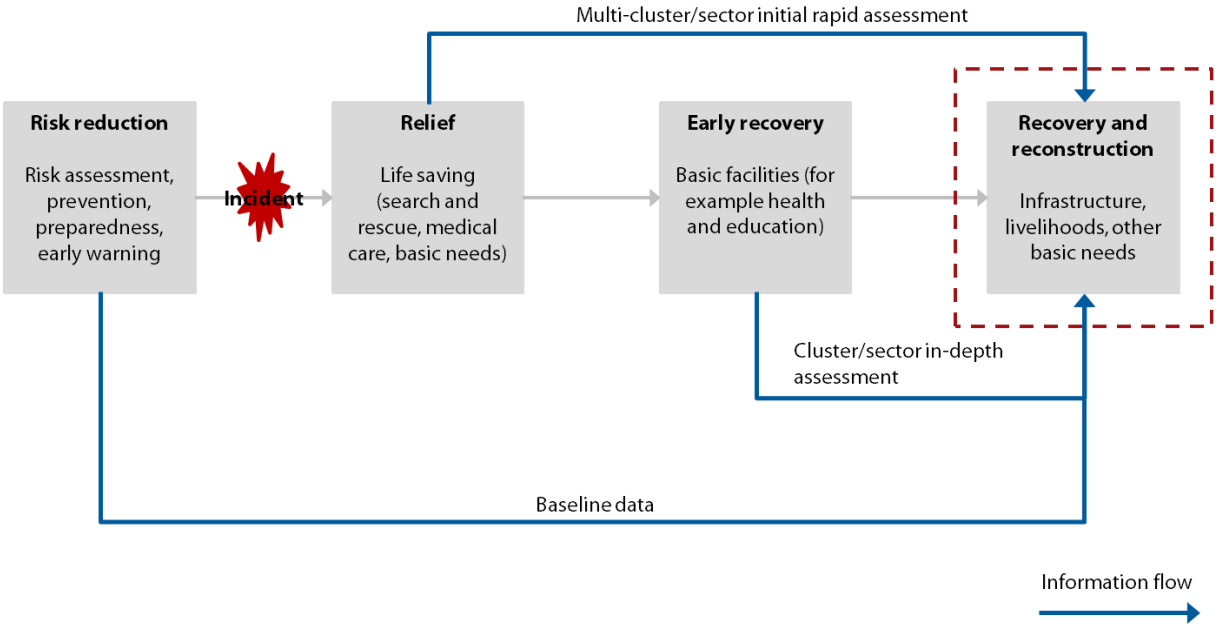

Figure 8 –The phases of a disaster and their interlinkage (based on [1])

[1] provide the following definitions for the identified phases:

- Disaster risk reduction includes all elements considered with a view to minimize the vulnerability and the risk of a disaster throughout a society and avoiding (prevention)

or limiting (mitigation and preparedness) the adverse impacts of hazards within a broad context of sustainable development.

- Relief (or response) is the provision of assistance or intervention during or immediately after a disaster to save and protect lives and meet the basic subsistence needs of people affected by the disaster.
- (Early) Recovery is the set of decisions and actions taken after a disaster with a view to restoring or improving the pre-disaster living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk. The United Nations International Strategy for Disaster Reduction includes rehabilitation and reconstruction as part of recovery (for further definitions see chapter 9.4.1).

Both figures (Figure 8 and Figure 9) point out that transition is a permanent process during the humanitarian aid. This is an organizational as well as technical challenge for the collaboration of NGOs that must be considered. For example baseline information (maps, population, administrative boundaries etc.) are usually compiled pre-disaster, e.g. during a census. These information as well as the assessment results are necessary for recovery and reconstruction activities. Also, different phases are usually addressed by different actors with a specific focus on relief or development. Thus processes and technologies are required that allow information management over a certain period of time and between alternating actors.

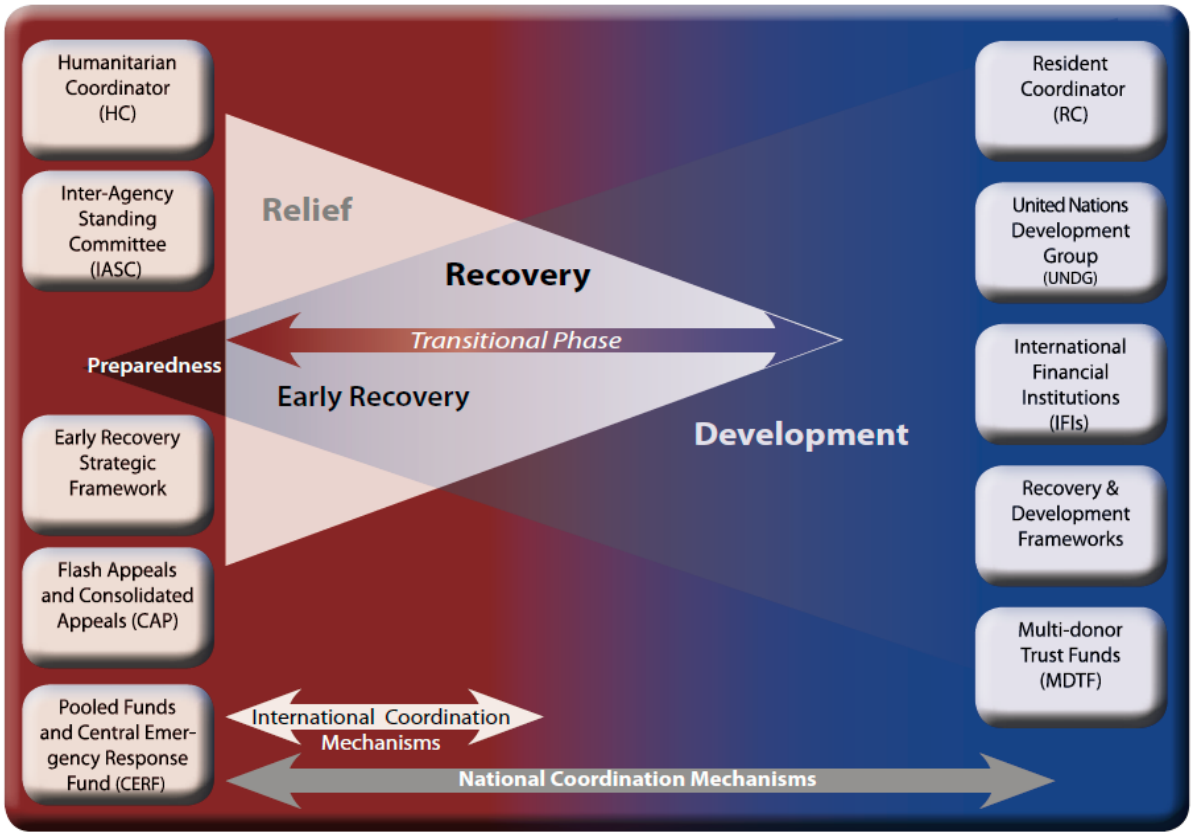

Figure 9 – Early recovery in the context of transition [5]

In general the following two types of transition can be differentiated:

(1) Transition between different phases (e.g. between early recovery, recovery and reconstruction, or from recovery/reconstruction to long-term development, or even from post-disaster to normality).

(2) Transition between organizations in one phase (e.g. one organization leaves the site operation before recovery/reconstruction is finished and another organization steps in).

The Cluster Working Group on Early Recovery defines transition as "the period after a disaster or conflict when pre-existing plans and programs no longer reflect the most pressing priorities. It is applied to many different, often overlapping processes of transformation. Early recovery is the response to this transformation process, starting immediately after the onset of a crisis." [5] (see Figure 9).

9 Exemplified collaboration working needs

In this section the collaboration needs are exemplified based on the PDNA framework. The logical process of the PDNA can be summarized into four major steps.

Pre-Disaster:

(1) Establishment of baseline information.

Post-disaster:

(2) Determination of the impact via assessments.

(3) Decision making (prioritization of activities).

(4) Recovery and reconstruction activities.

The starting point is the establishment of pre-disaster baseline information. After a disaster, the determination of the impact via assessments is necessary. The assessments provide the input information for the following decision making (prioritization). Finally the recovery and reconstruction activities take place [12].

For all four steps the following information is provided in order to derive the collaboration needs:

- **Definition/scope of the step.**
- **Collaboration working needs (e.g. typical decisions that have to be made).**
- **Information structure (e.g. typical information, data types and sources).**
- **Examples from the DESTRIERO end-users.**

9.1 Establishment of baseline information

The following section focuses on the establishment of baseline information. This information is crucial for any kind of humanitarian aid or relief activities and should be assembled in advance as part of the disaster preparedness.

9.1.1 Definition/Scope

Baseline information is essential and includes several sources of various data on populations, housing, transport infrastructure, health services, schools, geographical and meteorological data, and so on. The baseline information should be assembled in advance as part of the disaster preparedness.

If a disaster occurs the basic information needs are addressed and relief activities are supported. Also the baseline information is the basis for the following assessments and monitoring processes. In order to estimate the impact of a disaster (e.g. percentage of destroyed houses) pre-disaster information is essential. Also, monitoring the progress of recovery and reconstruction activities requires a baseline to measure against.

9.1.2 Collaboration working needs

Baseline information is scattered across agencies and may be in incompatible formats. In the midst of an emergency, it is difficult for humanitarian agencies to gather, interpret, and apply these data [1].

Three major collaboration working needs can be identified:

(1) Information gathering agencies should avoid collecting duplicate datasets. Also baseline information should be gathered pre-disaster. Thus the agencies have to agree on a joint or harmonized information gathering process (see 9.2.2).

(2) Information aggregation agencies have to agree on data standards to allow an easy integration of different (internal and external) data sources.

(3) Information distribution agencies must define a procedure how and when they distribute their relevant baseline information to other agencies.

9.1.3 Information structure

Nowadays baseline information is covered by the Common Operational Datasets (CODs) according to [14].

Common operational datasets are "predictable, core sets of data needed to support operations and decision-making for all actors in a humanitarian response. Some of the CODs, such as data on the affected population and damage to infrastructure, will change during the different phases of the response and therefore will need to be frequently updated and maintained. Other CODs, such as rivers and village locations, are likely to remain the same throughout the response. The CODs are proactively identified and maintained prior to an emergency as part of data preparedness measures and made available by the Office for the Coordination of Humanitarian Affairs (OCHA) (or pre-agreed in-country alternate) within 48 hours of a given humanitarian emergency. All CODs must meet minimum criteria for format and attribute information in accordance with national standards." [15]

"The CODs are made available by OCHA within 48 hours of an emergency and cover essential data on seven topics: humanitarian profile, population statistics, administrative boundaries, populated places, transportation network, hydrology and hypsography. The CODs are critical to support the work of humanitarian actors across multiple sectors." [15]

For the DESTRIERO project, we can use CODs as a starting point to define information and collaboration working needs in the field of baseline information. Table 3 summarizes the common operational data sets considered for the DESTRIERO project based on the works of [1], [14] and [26].

Table 3 – Common Operational Datasets

Minimum Common Operational Data Sets			
Category	**Data layer**	**Fields/Data characteristics**	**Recommended scale of source material**
Political, administrative boundaries	country boundaries administrative level 1 (province) administrative level 2 (district) administrative level 3 administrative level 4	p-code, name, population by administrative level (age, sex, average family size, number of households), parent unit, humanitarian profile (internally displaced, non-displaced affected, host family/resident community affected, refugee, dead, injured, missing)	1 : 250,000
Populated places	settlements built-up areas	p-code, name, population statistics, parent unit, class (provincial capital, village, spontaneous settlement, etc.)	1 : 100,000 – 1 : 250,000
Transportation network	roads railways	class (highway, secondary, dual, single etc.)	1 : 250,000
Transportation infrastructure	airports helipads seaports	name, class (civilian, military), capacity (runway length, max. vessel size, channel depth, lift capacity)	1 : 250,000
Hydrology	rivers lakes coastline	name, class (perennial, etc.)	1 : 250,000
City maps	computer-scanned city maps		1 : 10,000
Social infrastructure	primary schools health facilities	p-code, name, parent unit (community), class (primary school, hospital, etc.), capacity (classrooms, students, inpatients, etc.)	
Topographic	digital elevation		Shuttle Radar Topographic Mission with a nominal resolution of 90 meters

Minimum Common Operational Data Sets			
Category	**Data layer**	**Fields/Data characteristics**	**Recommended scale of source material**
Optional Common Operational Data Sets			
National map series	scanned toposheets		1 : 50,000 – 1 : 250,000
Satellite imagery	Landsat ASTER Ikonos Quickbird imagery		various
Natural hazards thematic		e.g. natural hazard mapping, see OCHA ROAP Map Center	various

9.1.4 Baseline-Example by SGSP

In this section the involved DESTRIERO end-user partner Szkoła Główna Służby Pożarniczej (SGSP) outlines the collaboration working needs on a real example of its activities regarding "Establishment of baseline information".

Establishment of baseline information is a complex activity, also within the frames of crisis management in Poland. It is a part of the planning in the pre-crisis phase. Generally, local authorities are responsible for crisis management, as it is their duty and moral obligation. What should be mentioned is that if the consequences of a crisis will cross the particular administrative boundaries, higher crisis management level is activated. It constitutes the main concept of crisis management system in Poland. Detailed explanations are presented in Table 4.

Table 4 – Polish Crisis Management System's structure

Crisis management level	Decision maker	Crisis management centre
Country	The Cabinet	Government Centre for Security
Regional	Minister	Departmental crisis management centre
Voivodeship[2]	Governor (Voivode)	Voivode crisis management centre
County	Starost	County crisis management centre
Communal	Commune mayor	Communal crisis management centre

[2] 'Voivodeship' is a high-level administrative subdivision of Poland, comparable to province. Poland was divided into 16 voivodeships. Each voivodeship consists of a number of 'powiats', led by 'starosts' (379 in whole Poland; comparable to counties). Lower level of administrative division of Poland is called 'gmina', led by 'wojt' (2478 in whole Poland; comparable to community/municipality).

The crisis management system is the most important, managerial element of national safety regulations, when facing man-made and natural hazards. In case if available technical capabilities and human resources, but also financial resources are insufficient, the next step will be to declare one of extraordinary measures: state of emergency, state of natural disaster or martial law (allowed in the Constitution of the Republic of Poland). However, to prevent this, what means to ensure appropriate level of readiness for mitigation and prevention of any prospective danger, holistic and comprehensive planning is necessary. The foundations of the system are based on widely understood crisis management plans. The following exemplary documents are necessary for crisis management:

- Crisis management plans for all administrative levels of subdivision,
- Rescue plans for all administrative levels of subdivision,
- Operational plans for protection from floods for all administrative levels,
- General operational plans for all administrative levels,
- External and internal operational plans for crucial industries,
- Civil defence plans.

The documents concerning collaboration during recovery and reconstruction phase are integral part of previously mentioned plans. They are prepared in pre-crisis phase of crisis management in purpose to ensure best performance of public services and supporting governmental and non-governmental organizations. The statements of the documents should be implemented prior to the crisis to improve the preparedness of the communities, as well as of public services and local authorities. The documents crucial for appropriate decision-making during crisis are as follows:

- Catalogue of dangers,
- Description of rights and obligations of particular actors of crisis management,
- List of available safety resources (people, equipment, etc.),
- Risk maps,
- Risk analyses,
- Procedures of crisis management,
- Communication strategy,
- Monitoring of hazards, procedures for warning and alarming,
- Principles of public communication in crisis and pro-safe behaviour patterns,
- Organization of evacuation,
- Rescue, medical, social and psychological assistance organization,
- Protection against typical hazards,
- Procedures for dispatch of higher level operational reserves,
- Critical infrastructure identification and description,
- Critical infrastructure protection and recovery priorities.

Nevertheless, taking into account national regulations, crisis management is not only about "management". There are many additional, executive institutions closely related to, so called, "civil planning". The most important of them is the State Fire Service (SFS), of which SGSP is

an integral element. SFS is supervised by the Ministry of Interior, is one of the basic parts of the National Firefighting and Rescue System (NFRS) – an integral part of the internal safety structure of the state. The Chief Commandant of SFS is the central authority responsible for the organization of fire protection and the NFRS.

As the responsibilities of SFS are wide, experienced officers (decision makers) are also involved in civil planning activities. They are a part of crisis management teams and have active influence on the content of emergency plans in Poland.

Two main activities to establish baseline information are conducted within the structures of SFS:

1. Documentation of fire and rescue activities realized within the structures of SFS and with other services and institutions.
2. Contribution to civil planning.

Taking into consideration the former activities, it might be divided into smaller elements, presented in Figure 10.

Gathering basic information is the first step of baseline information establishment. Information concerning infrastructure and population of a particular administrative subdivision is analysed. It is crucial for ensuring safe and efficient reconstruction and recovery during post-crisis activities, as well as necessary for further development of baseline information: risk assessment and the modelling the usage of SFS resources. It should be emphasized, that all involved institutions are a part of the modelling process.

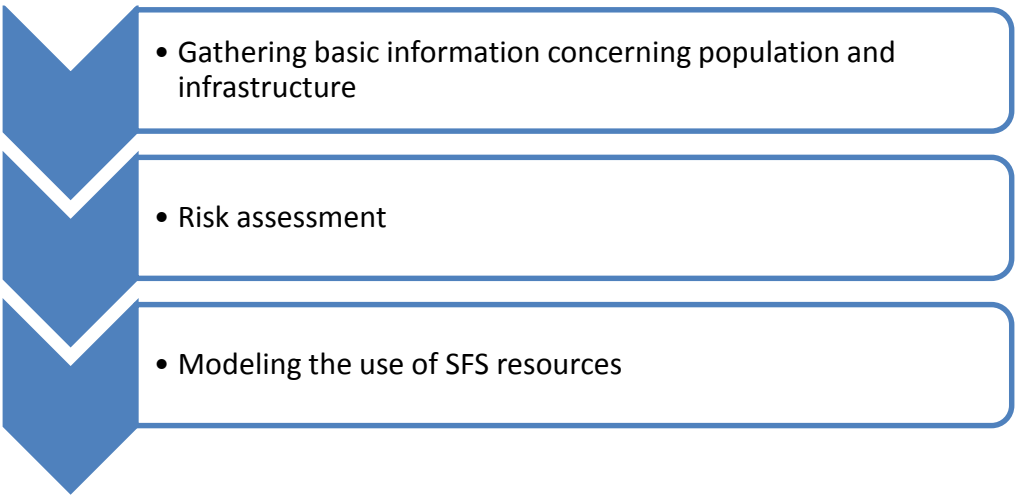

Figure 10 – Typical activities during "Establishment of baseline information"

Considering the collaboration working needs during the reconstruction and recovery phase, the following information is crucial:

1. Information about population:
   - Number of people in particular administrative subdivision.
   - Number of available firefighters, police officers, staffed ambulances and other responders.
   - Internal executive procedures of responders, including the organization of communication.
   - Availability of technical equipment (e.g. pumps, power generators, heavy equipment).
   - Location and capacity of hospitals, schools and other potential temporary shelter for evacuees.
   - Location and characteristics of objects requiring extraordinary attention during evacuation (i.e. hospitals, schools, prisons, healthcare centres)
   - Procedures for public communication in crisis, including cooperation with press.

2. Information about the infrastructure:
   - Identification and description of crisis infrastructure (e.g. objects, installations, services).
   - Location and capabilities of potential evacuation routes, also bottlenecks, possible shelters, healthcare, etc.
   - Emergency coordination centres.
   - Communication equipment, both conventional and wireless.
   - Alternative means of communication equipment and procedures.

Risk assessment concerns hazards prospected for particular location, their potential causes for local community and infrastructure. This activity allows the determination of the most dangerous areas and strongly contributes to scenario creation. For that reason following questions should be answered:

1. What are the most probable dangers in a particular area?
2. Which of the identified dangers can lead to domino effect and in what way?
3. What is the worst case scenario and what kind of cause-effect sequence will lead to it?
4. Which communities and which elements of infrastructure will be affected by identified scenarios and why?

As SFS is a leading organization during crisis (being a part of NFRS), modelling of resources concerns mainly human resources and technical equipment of that formation. However, also other institutions which are involved in crisis management are taken into consideration, having a status of supporting organizations.

The whole analysis is basing on previously gathered data (as described above). The final outcome of that last step of baseline information establishment will allow to:

- Determine insufficient resources (both human and technical).

- Modify current rescue resources dispatch procedures.
- Decide whether to relocate or create new departments of institutions lacking in the most dangerous areas.

The SFS has access to typical fire and rescue information databases. Most of them have the source in SWD-ST system (System Wspomagania Decyzji – Straż Pozarna; decision support tool and statistical database). The software is accessible only from internal networks of organizational units of SFS, especially dispatch centres of all levels. Statistical database consists of information about all former interventions (fires, other dangers and false alarms). Resource data base contains information concerning all units within the structures of NFRS: SFS, Voluntary Fire Service, chosen hospitals and external contracted experts. Unfortunately, external organizations might only access the databases with special permission of the SFS Headquarters or the Ministry of Interior.

It must be emphasized that not all information of emergency plans are publicly available. Some documents, like the list of critical infrastructure, are confidential, as well as chosen parts of other ones (e.g. crisis management plans, civil defence plans). Also there are some parts available only for the institutions they concern.

9.1.5 Baseline-Example by PSNI

Before the example is given an introduction into the fictional threat and the underlying Northern Ireland Civil Contingencies Framework is outlined.

The fictional threat is a Coastal/Tidal Flooding of the East Coast of Northern Ireland, including Belfast City.

The overarching aim of the Northern Ireland Civil Contingencies Framework is to return the community to normal life as quickly and safely as possible following a Major Incident.

The PSNI works within the Civil Contingencies community using the 6 principles of Integrated Emergency Management, which are:

(1) Anticipation;
(2) Assessment;
(3) Prevention;
(4) Preparation;
(5) Response; and
(6) Recovery.

(1) The Anticipation Phase.

The Anticipation Phase is conducted pre-incident and consists of establishing baseline information for future use during and after a Major Incident. This information is gathered by individual statutory agencies and businesses, such as utility companies. The baseline information includes:

- Population and demographics;
- Individual agency Vulnerable Persons Lists;
- Locations of critical infrastructure;
- Locations of hospitals, schools and care homes;
- Modelling of potential flooding levels relating to rivers, flood plains and coastal/tidal flooding;
- Mapping; and
- Command and Control Centres and systems.

The Police Service leads during the Response Phase of a Major Incident in the UK and the Recovery Phase is led by either local or central government, depending in the scale of the incident.

In the UK the established Command and Control structure used by Police is hierarchical and is:

- Gold (Strategic);
- Silver (Tactical); and
- Bronze (Operational).

Other agencies use this hierarchical Command and Control structure and it is understood throughout the Civil Contingencies community. Closely linked to this internal command structure is the system of multi-agency co-ordination, which can be activated in a pre-planned manner or spontaneously during the Response Phase. It is:

- The Strategic Co-ordination Group (SCG), which sits alongside Police Gold in a bespoke Strategic Co-ordination Centre (SCC); and
- The Tactical Co-ordination Group (TCG), which sits alongside the Police Silver in a bespoke Tactical Co-ordination Centre (TCC). There can be a number of Police Silvers and TCGs, all reporting to a single Police Gold, depending on the scale of the incident.

Membership of the SCG and TCG will be dependent on the nature of the incident.

In order to engender close working relationships and to build trust within the multi-agency environment five local responder groups were formed, which meet regularly to discuss civil contingency issues. These groups cover Northern Ireland and members of these groups are able to form the SCG and TCG when required, thereby ensuring familiarity among individuals.

Part of the overall command and control system includes use of an IT platform known as CLIO, which allows the Police and the multi-agency partners to share information in a timely manner and to record decisions and rationale on a common database.

Land and Property Services (LPS) is a government agency, which provides mapping for multi-agency use during such incidents. Other agencies share baseline information with LPS, which is then layered onto the mapping and is able to inform post incident assessments and decision making during the Response and Recovery Phases.

(2) The Assessment Phase.

The Assessment Phase is conducted pre-incident and consists of a risk assessment of all potential natural hazards and manmade threats faced by the community. This informs the Prevention Phase.

(3) The Prevention Phase.

The Prevention Phase is conducted pre-incident and consists of mitigation to reduce or to remove an identified risk and to inform the Preparation Phase.

(4) The Preparation Phase.

The Preparation Phase is conducted pre-incident and consists of preparing plans and protocols, which are required to minimize the adverse effects of an incident. This includes Information Multi-Agency Sharing Agreements (ISA).

This phase also informs decision making on single and multi-agency exercising, which is also linked to the Assessment Phase.

(5) The Response Phase.

The Response Phase is conducted either immediately prior to an anticipated incident or following the report of the incident occurring and consists of a number of sub-phases:

- Reaction;
- Rescue; and
- Retrieval (of evidence and fatalities).

Recovery starts during this phase with the formation of the Strategic Recovery Group (SRG). The criterion to be met for handover of lead agency is also agreed at this point.

(6) The Recovery Phase.

As the Recovery Phase is started during the Response Phase it allows the SRG to conduct early assessments and minimize the duration of recovery, thereby reducing suffering. It consists of a number of sub-phases:

- Relief;
- Remediation; and
- Regeneration.

In the following paragraphs the involved DESTRIERO end-user partner Police Service of Northern Ireland (PSNI) outlines the collaboration working needs on a fictional example of their activities regarding "Establishment of baseline information".

Typical activities are those conducted during the Anticipation and the Response Phases and are:

- During the Anticipation Phase pre-incident baseline information has been established.

- The Police Service would lead during the Response Phase and would establish a Police Gold and a number of Police Silvers with multi-agency co-ordination with each (the SCG and a number of TCGs).
- In the event of widespread coastal/tidal flooding these structures would be set up prior to the event.
- Using the SCG a Common Recognized Information Picture (CRIP) would be agreed, which included post incident assessments on fatalities, causalities and damage to housing stock & critical infrastructure and actions to reduce the adverse effects on the community would be agreed. This would establish the post-incident baseline.
- A Strategic Aim would be issued to TCGs, who would implement it.
- A missing persons reporting system, known as Disaster Victim Identification (DVI), Causality Bureau would be opened, if required.

Information needed to inform this activity:

- Using the SCG a CRIP would be agreed, which included post incident assessments on fatalities, causalities and damage to housing stock and critical infrastructure and actions to reduce the adverse effects on the community would be agreed. This would establish the post-incident baseline.
- Specialist advice regarding flooding from meteorological experts would be gathered.

Information gathered during the Anticipation Phase, such as that listed above would be held. The baseline information includes:

- Population and demographics;
- Individual agency Vulnerable Persons Lists;
- Locations of critical infrastructure;
- Locations of hospitals, schools and care homes;
- Modelling of potential flooding levels relating to rivers, flood plains and coastal/tidal flooding;
- Mapping; and
- Command and Control Centres and systems.

Information we can technically/legally provide to others:

- Under the CCA there is a requirement to share information during an emergency. A number if ISAs are also in place to ensure that information is shared.

9.1.6 Baseline-Example by AMI

In this section the involved DESTRIERO end-user partner Fundação Assistência Médica Internacional (AMI) outlines the collaboration working needs on a real example of their activities regarding "Establishment of baseline information".

In the following exercise, it will be used as an example the humanitarian response to the Haiti affected population by the 12th January 2010 earthquake. The approach taken to explain the

process will be performed integrating the identified information needs in all the process, mentioning them whenever relevant.

For AMI, there is a great amount of baseline information within the scope of emergency scenarios, which should be regularly monitored.

Partnership network with other NGOs (bottom up): AMI has adopted as a strategy to establish partnership with several local organizations distributed worldwide in developing countries in which we fund development projects and send expatriates and internships. These NGOs are regularly contacted by AMI in order to rapidly provide information on any disaster that can occur in any place of the country where they are based at. The partners are well established in their countries and besides their rapid response information capacity, they can provide AMI with logistical support prior and upon arrival of AMI emergency response team. Moreover, if they work in the same sector as AMI does (mainly health), we might establish a common joint intervention. They might also be strategic partners during the phasing out of expatriate teams, usually associated with recovery/reconstruction stage.

In Haiti, three months prior to the earthquake, an headquarter (HQ) team visited the country precisely to search for partners that latter on, after the earthquake, were of most importance in information update delivery and logistical problem solving when the response team was on the way to the affected area. By that the time of this first visit to Haiti, AMI was seeking the establishment of a network to act in a possible disaster scenario caused by the hurricanes that seasonally affect the region. It was not therefore expected at all that an earthquake of that dimension would destroy the capital of the country.

When the earthquake occurred, one of our first steps was to contact those partner NGOs from our headquarters in order to gather more information about the situation in the field and to have information about the best way to enter in the country. After our arrival to Port-au-Prince we visited the NGOs in order to make a needs' assessment. Unfortunately one of them was totally destroyed. The other was partially affected.

Partnership network with donors (top down): AMI was until the end of last year a DG ECHO (European Commission Humanitarian Office) partner, which is one of world's biggest humanitarian donors, along with the European member states. In order to be able to submit projects for funding during a crisis situation, the NGOs must have a Framework Partnership Agreement previously signed with them (and the NGOs must also belong to European Union).

Besides a major funding partner, DG ECHO which also deploys staff to the field, constantly releases information regarding ongoing emergencies and risk assessments as well that are of great baseline use.

Information databases: World Health Organization (WHO) has for each country a previous defined set of key demographic and health information that can be used as baseline indicators[3]. The main constrain about this set of data is related to the inconsistency of the data collection that can be compromised and biased in many countries, as well as with the non-

[3] Example of Haiti available at http://www.who.int/countries/hti/en/

regular update of the data, making at sometimes the data to be used only for guiding purposes and not to be used as solid baseline information.

Although CODs are a response to an identified problem regarding information availability, are still not regularly used by AMI as baseline information database because it is mostly focused (prior to a disaster) on geographical mapping and so, is not considered as key priority database for AMI as although geographical information is important, there are other sources more developed in it such as Reliefweb[4] and Google Maps.

Other databases are used, such as UNOCHAs manages Reliefweb and Irin News[5] used mainly to follow the global situation on disasters and best practices on humanitarian response. The Centre for Research on the Epidemiology of Disasters (CRED) is also of added value when trying to get deeper understanding the trends of occurrence of emergencies by types of disaster. Finally, when enhancing the time response we must be sure to get real-time notifications about any disaster that hits the globe. For this, AMI uses the Global Disaster Alert and Coordination System (GDACS) assuring real-time notification of any disaster that takes place worldwide.

Other relevant baseline information is concerned to the development and improvement of push models intervention. This strategy is to be applied in emergency settings as a way of compensating the lack of information available resulting of a time limited needs assessment. Instead of the pull models, based on exhaustive needs assessment, push models focus on the type of disaster and previously defined interventions to respond timely, and with assured quality. For this, the information sources come mainly from the evaluation of previous humanitarian interventions of AMI, and studies published in the Quality and Accountability Initiatives (Q&A Initiatives) such as The Active Learning Network for Accountability and Performance in Humanitarian Action (ALNAP; www.alnap.org), Humanitarian Accountability Partnership (HAP; http://www.hapinternational.org/) and People in Aid (www.peopleinaid.org).

As an example, for the Haiti response, mobile clinics were implemented by AMI within the sector of health response, amongst other sectorial interventions performed. This type of action was already designed and used on previous disaster situations. By this, the intervention was already defined in terms of adjusting the ratios of resources needed per a pre-defined amount of beneficiaries. As an example, we can see the Interagency Emergency Health Kit 2011, designed to support with Medicines and medical devices a population of 10.000 people for approximately three months [13].

At this stage, we consider that the provision of information is not substantially relevant when comparing with other stages. Notwithstanding, AMI provides information on the activities and results achieved, to its partners (WHO, MOH and others), when working in development interventions in countries prone to disasters. The information depends on the scope of the intervention and intends to aid on the establishment and accuracy of baseline indicators.

[4] http://reliefweb.int/
[5] http://www.irinnews.org/

In summary the following indicators (baseline information) are specifically useful for AMI health interventions.

Key demographic indicators:

- Total Population.
- Population living in rural areas (in percentage).
- Gross national income per capita.
- Total fertility rate (per woman).
- Life expectancy (at birth, at 60 years old, under five years old).

Key Health indicators:

- Mortality rate by cause of death (adults and under five).
- Immunization DTP3 and Measles.
- Incidence rates of tuberculosis, malaria, HIV and other relevant diseases for the country.
- Burden of disease.
- Utilization of health services.
- Human resources for health.
- Per capita total expenditure on health.
- Population using improved water and sanitation.

9.2 Determination of disaster impact (Assessments)

The following section deals with the determination of the disaster impact. This is usually done by different kinds of assessments that provide valuable information about the current situation and the needs that must be addressed by the humanitarian aid.

9.2.1 Definition/Scope

Assessments can be defined as "the set of activities necessary to understand a given situation. They include the collection, up-dating and analysis of data pertaining to the population of concern (needs, capacities, resources, etc.), as well as the state of infrastructure and general socioeconomic conditions in a given location/area" [21].

Also, an assessment should "document the extent, nature and implications of damage that occurred as a result of a disaster, outline the investments that are required to repair or replace damaged or lost assets, restore access to services and determine the significance of economic losses. [...] Assessments provide an overview of the damage, losses and needs at the time the assessment is conducted" [12]

9.2.2 Collaboration working needs

The major dependencies between relief units in this step are driven by the types of assessment. According to [15], two types of assessments can be differentiated.

(1) Coordinated assessments.

a. Harmonized assessments.

b. Joint assessments.

(2) Uncoordinated assessments.

Coordinated assessments are those planned and carried out in partnership by humanitarian actors, and of which the results are shared with the broader humanitarian community to identify the needs of affected populations. Such assessments range from inter- and intra-cluster respectively sector joint assessments to harmonized single agency assessments.

Harmonized assessments occur when agencies collect, process and analyze data separately, but where the collected data is sufficiently comparable (because of the use of common operational data sets, key indicators, and geographical and temporal synchronization) to be compiled into a single database and used in a shared analysis.

Joint assessments occur when data collection, processing and analysis form one single process among agencies within and between clusters/sectors, and lead to the production of a single report. This is sometimes also referred to as a "common assessment".

In contrast, uncoordinated assessments are those in which data sets are not interoperable, and results cannot be used to inform the overall analysis. Such assessments may serve the interest of the conducting agency in the best way, but should be avoided if the sharing of information is considered a relevant aim.

Also needs assessments should be designed with situation and performance monitoring in mind. Initial data on needs can be used as baseline data for comparison with data subsequently drawn from monitoring systems and help show whether interventions have been successful in responding to identified needs [15].

9.2.3 Information structure

In this section the information structure is defined by the collections methods (how can the agencies gather the necessary information?), the units of measurements (what level of detail must be obtained?) and typical information in the form of indicators for recovery (what information has to be collected?).

Data may be classified as primary or secondary based on who collected them. Primary data are data gathered by the needs assessor directly from the respondent. Secondary data are data that are collected by others but that are reviewed and analysed by the assessor [15]. The chosen collection method also implies what kind of meta-data must be collected.

Common collection methods are:

- Household surveys,
- Quick counts,
- Focus group discussions,
- Key informant interviews,

- Visual observation e.g. satellite imagery, flyovers, drive-bys,
- Transect walks,
- Agency reports,
- Risk assessments,
- Survey data gathered and reported by others
- Census data,
- Government reports and administrative records,
- Facility use reports,
- Interior and exterior building plans.

Table 5 lists the units of measurements that indicate the level of details that must be obtained [15]. These different levels of units should not be mixed when information is gathered, transformed or presented.

Table 5 – Units of measurement

Unit	**Example**
Communities (e.g. towns, settlements, camps etc.)	Does this village have a functional health clinic?
Institutions (e.g. schools, hospitals)	How many trained nurses work at this health clinic?
Households	What illnesses have your family members had during the last week?
Individuals	What illnesses have you had during the last week?

Indicators that give a clear idea of information that has to be collected are shown in Table 6 [1] and adapted from the World Health Organization (WHO) and International Federation of Red Cross and Red Crescent Societies (IFRC). The aggregation to an indicator can also be understood of an information product (output).

Table 6 – Selected Indicators of Recovery and Reconstruction

Areas	**Basic societal functions**	**TRIAMS recovery output indicators**
Vital needs	search and rescue, water and sanitation, food, shelter and clothing, medical care, security	– % of population with access to water from an improved source, by administrative level – % of population without basic sanitation facilities, by administrative level – household food consumption, 24-hour recall – proportion of the tsunami-affected population with damaged or destroyed housing, living in emergency shelters or temporary or permanent houses, by subdistrict, by time period

Areas	Basic societal functions	TRIAMS recovery output indicators
		– measles immunization coverage, by administrative level – number of titles to land issued, by economic status, by gender, by district
Basic social services	public health, education	– number of primary-school children per school, by subdistrict – number of primary-school children per teacher, by subdistrict – number of hospital beds per 10,000 population (inpatient and maternity), by subdistrict or district – number of outpatient consultations per person per year, by administrative level % of children 12–23 months of age who are fully immunized against all antigens, by administrative level – number of health facilities with emergency obstetric care per 10,000 population, by subdistrict or district – adequate antenatal coverage (at least four visits during a pregnancy), by subdistrict – % of subdistricts covered by mobile psychological support workers, by district
Infrastructure	public works and engineering, energy supplies, logistics and transport, communications, environment	– number of kilometres of repaired or new road, by type of road, by district – number of bridges repaired, by district – number of harbours and jetties rehabilitated, by type, by district – % of destroyed or damaged schools rebuilt or rehabilitated, by category, by subdistrict – % of destroyed or damaged health facilities rebuilt or rehabilitated, by category, by subdistrict – number of square kilometres of natural habitat restored, by type – number of kilometres of coastal protection, by type (biofencing, seawalls, quay walls, breakwaters), constructed or repaired, by district
Livelihoods	economy	– number of square kilometres of land returned to crops, by district – % of tsunami-affected population that has received loans, by administrative level, by gender

Areas	Basic societal functions	TRIAMS recovery output indicators
		– % of tsunami-affected population enrolled in social protection programs, by gender, by subdistrict – number of people employed, by sector, by district, by gender – % of damaged or destroyed boats repaired or replaced, by use (fishing, tourism, ferrying, and other income-generating activities), by district

9.2.4 Assessment-Example by SGSP

In this section the involved DESTRIERO end-user partner Szkoła Główna Służby Pożarniczej (SGSP) outlines the collaboration working needs on a real example of its activities regarding "Assessment".

Assessment is a logical consequence of crisis occurrence. Complete, actual, trusted and thorough information is needed to make a base for decision making processes. The assessment could be divided into three following activities (see Figure 11).

Figure 11 – Activities constituting the "Assessment" phase

New data gathering is a fundamental step of assessment. To make correct decisions, such information will be required:

- Type of danger, its characteristic, nature and change describing mechanisms.
- Range of danger zone and direction of danger's dispersion/development.
- Affected population and infrastructure, direct danger to people, critical infrastructure and rescue resources involved.
- Potential safe or safer areas.
- Available rescue resources (people and equipment).
- Sheltering.
- Sense of safety within the community.
- Collaboration and communication capabilities.

SFS is dedicated to face crisis situations and their negative consequences, especially during peacetime. Firefighters and other executors of NFRS are usually the first ones in the field. That creates a possibility to gather information directly for local authorities which can be used for decision making. Taking into account the nature of their work, focus group discussions are a proper way of collecting information – information, which could be transferred to other involved organizations if needed.

Data gathering is an iterative process, as all information becomes out-of-date after a period of time. It is also crucial for emergency plans to be updated. As described above, this information is usually the input for various analysis tools. When searching for the differences, following questions should be answered:

- Are there any significant differences?
- What is a character of the differences?
- What kind of additional threats are generated by these differences?
- How do the differences influence current content of civil planning documents?
- Is it necessary to modify these documents?

Among a number of available analysis tools, being a part of fire safety engineering, SFS (also SGSP) usually take advantage of following software:

- Aloha (Areal Locations of Hazardous Atmospheres, made by US Environmental Protection Agency and US National Oceanic and Atmospheric Administration): An atmospheric dispersion model used for estimation fires', explosions' and hazardous chemical vapours releases' zones; an integral component of CAMEO.
- Marplot (Mapping Applications for Response, Planning, and Local Operational Tasks, made by US Environmental Protection Agency and US National Oceanic and Atmospheric Administration): A mapping application allowing to visualization of Aloha-made zones and their impact to local environment, an integral component of CAMEO.
- Cameo (made by US Environmental Protection Agency and US National Oceanic and Atmospheric Administration): A system of software applications used to plan for and respond to chemical emergency events.
- Water (made by SGSP): Software dedicated to simulate flood threat development in urban area and crisis management activities' influence for flood safety.
- ArcGIS Desktop (made by ESRI): A kind of geospatial information system which allows making spatial analysis and creating maps.
- EFFECTS (made by TNO): Software to assist in performing safety analysis for the chemical and petrochemical industrial plants, allowing calculating and visualizing physical effects of accident scenarios with toxic and/or flammable chemicals.
- Pathfinder (made by Thunderhead Engineering): A simulating tool for path evacuation calculation and its 3D-visualization from buildings and areas.
- RIZEX-2 (made by Ukrainian National Risk Research Center RIZIKON): Complex software for modelling of industrial accidents effects and chemical risk assessment.

The software allows assessing the range of danger zones, modelling its dispersion/development and predicting further, consecutive implications. Geographic Information Systems (GIS) are helpful in conducting more detailed and complex analysis, as well as in visualization of analysing results. Created maps could be essential in decision making. Exemplification of Aloha and GIS usage in mass evacuation planning is showed in Figure 12.

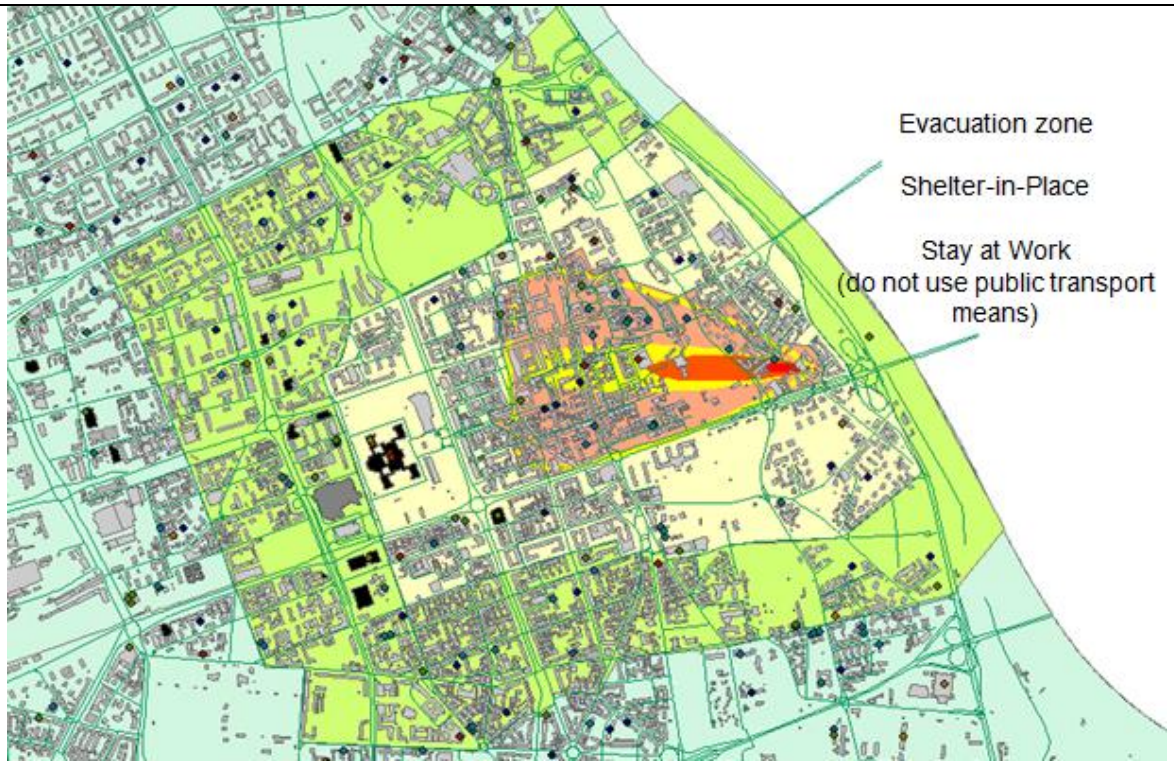

Figure 12 – Aloha and GIS usage in mass evacuation planning

Decision makers should remember about classical scientific tools designed for various analyses, as follows:

- TNT method: A method using for explosion power calculation on the base of TNT explosion material power.
- TNO method: A multi-energy method dealing with a huge explosion as several smaller ones, useful in chemical clouds fire analysis.
- Gauss model: A model of gas dispersion, appropriate in case of analysing gases with similar-to-air density, useful taking into consideration chemical gas leakage.
- Heavy gas model: A model of gas dispersion, appropriate in case of analysing gases with heavy-than-air density, useful taking into consideration chemical gas leakage.
- TOL analysis: An accident analysis method which focuses on technical, organizational and human causes of the accident.
- Event tree method: A bottom-up method which by deductive events analysis (Boolean logic usage) allows to meet causality – consecutive connections between indirect event reasons.
- Fault tree method: A top-down method, which by deductive failure analysis (Boolean logic usage) allows to meet causality – consecutive connections between indirect event reasons.
- Matrix risk assessment method: A "classical" risk assessment method, involving subjective determination of probability and causes of emergency events.

- Probabilistic risk assessment method: An advanced risk assessment method that allows to predict potential probability and causes of emergency events by the use of expert knowledge in the assessment proceeding.
- Risk score method: A method of work risk assessment which could be implemented on civil protection area of knowledge.

Results of all analyses could be provided to all institutions involved in crisis management as long as the data is not sensitive.

In general, it is a serious challenge to appropriately predict detailed nature of the danger and its development. Usually it is necessary to modify ad-hoc emergency plans. At least these could be potentially shared with other institutions involved in the operations.

9.2.5 Assessment-Example by PSNI

In this section the involved DESTRIERO end-user partner Police Service of Northern Ireland (PSNI) outlines the collaboration working needs on a fictional example of their activities regarding "Assessment".

Brief description of typical activities:

- As previously discussed post incident assessments would be conducted a operational levels by all agencies. This information would be fed upwards and where an information gap was identified a tasking for more information would be issued.
- The CRIP is used to share this.

Information needed to inform this activity:

- Information on the direct and indirect impact of an incident would be required. This would be discussed at the SCG, where all agencies would share how events would impact on their area of business.

Information already held:

- Business Continuity Plans (BCM) would provide individual agencies with the actions to be taken to mitigate and would provide information.

Information we can technically/legally provide to others:

- Due to the nature of multi-agency working protocols are in place, which allow the sharing of this information.

9.2.6 Assessment-Example by AMI

In this section the involved DESTRIERO end-user partner Fundação Assistência Médica Internacional (AMI) outlines the collaboration working needs on a real example of their activities regarding "Assessment".

Assessment is performed firstly at HQ level and afterwards, if any AMI team is present in the affected country, at field level (if its already present in the field, the process is simultaneous at HQ and field level).

After a disaster, the first 24 hours are dedicated at HQ level to gather information through the already mentioned baseline databases that should release initial information on the magnitude of the disaster and expected impact on the population.

If existent, AMI's local partner on the field should be contacted, as well as the Portuguese embassy or consulate. At Portugal, the embassy of the affected country should also be contacted. When there is no Portuguese diplomatic representation, we might contact a neighbouring country embassy, such as the Spanish one.

For the assessment and coordination at the field level, the humanitarian cluster system is critical. This is the approach followed by the humanitarian actors since 2005, in order to assure less gaps and overlaps in the humanitarian assistance provided by humanitarian organizations. It involves NGO, IOs and UN organizations and it is coordinated by the Inter-Agency Standing Committee (IASC). The cluster approach identified 11 sectors of intervention that might be activated depending on the crises: health, food security, education, early recovery, camp coordination and camp management, water sanitation and hygiene, shelter, protection, nutrition, logistics and telecommunications. Each of the sectors has a cluster agency leader.

When arriving to the field, the humanitarian NGO must go directly to UNOCHA in order to make its registration whenever this agency is coordinating the international relief. (The exception would be a scenario with refugees which would have the UNHRC has coordinating entity). The cluster lead of the proposed sectorial intervention (in the Haiti example case, WHO as the cluster lead for health) will be contacted as well. The health cluster, for instance, will provide information on a daily basis to its partners about main health needs, the state of health infrastructures, the quantity of human and medical resources available, etc. It also shares information about who is doing what and where. This will allow to quickly identifying sites (hospitals, camps and communities) where to make assessment.

Besides the above mentioned sources of information, the media play an important role as well. Their capacity on information dissemination should not be taken undercount, nonetheless, this information should be analysed carefully since it may be sometimes considered as less reliable and sometimes partial with the in tempt of catching the people's attention by inflating the magnitude of a certain disaster and its effects.

After the first day and if a team is not available at the affected country, it is mandatory that an HQ team is to be sent to the field with the intent of starting an assessment that will define the strategy of intervention. Despite the expectation of prompt arrival of the team to the affected area, the travelling time will vary according to the distance and condition of transport infrastructures within the affected area. This difference in time arrival can vary from the arrival after 24h of the onset of the disaster, until 5 days. There is also the case of entrance denial by the local authorities if they are refusing international aid delivery, but in this case it will not be considered as an effective humanitarian intervention, but solely the intent of intervenes. This case will not be discussed further in this analysis.

This team will connect upon arrival with the general coordination mechanism put in place (cluster lead or UNHCR in case of refugee setting), and will immediately get the information available at the moment.

At the arrival, and upon the information already provided by the various sources, we can expect to have narrowed the possibilities of intervention to the most effective according with the described situation. For instance, if the health cluster lead of Haiti would advise partners not to act with foreign medical teams, the strategy for deployment of our medical team would be placed aside and other interventions such as for example the reinforcement of the local health capacity through training or donation of material resources would be prioritized as a possibility. AMI was faced with this situation in its last emergency mission in Philippines after the typhoon Haitian last November.

Usually, the first essential information regarding to the health response are:

- Estimated number of dead.
- Estimated number of affected.
- Population movement? How many estimated, to where?
- Number of functional and damaged health infrastructures (if possible distributed by level of care provided and inpatient capacity).
- Immediate and urgent health needs.
- Partners already set and responding.
- Already identified multi-sectorial needs.
- Official treatment protocols available?
- Any other guidelines on the specific humanitarian response available?

Security situation:

- Database on the Aid Worker Security Database (www.aidsecurity.org).

At the field level, the logistics cluster might also provide us useful and daily updated information about the security situation. For instance, regions/areas accessible or inaccessible; closed roads; military controlled entrances; areas controlled by the armed forces, etc.

Logistical information:

- Access to the affected area.
- Legal procedures for entering the country and affected region.
- Telecoms.

The type of assessment performed will depend essentially on the information already available upon arrival to the affected area. If essential information is available, AMI considers that the overall coordinated assessment has already been done and proceeds with uncoordinated assessment with the sole purpose of completing the information specific for the project design. The information needed will be selected on a case by case situation, since it aims at filling the gaps of specific operational information that will make possible the implementation of the already chosen strategy of intervention.

Following the example given of Haiti, after identifying three Internally Displaced Person (IDP) camps which needed to be covered by mobile clinics, one must know the time travelling distances between each camp so a medical consultation calendar can be defined and operational.

If any coordinated assessment has still been done, then AMI, as any other partner, can participate on the either joint or harmonized assessment coordinated by the cluster lead, as performed in 2009 at Indonesia after the earthquake in Sumatra Island.

At last but not least, for the situation where any coordinated assessment has been yet, and no assessment is being planned, or will delay the urgent response time, an initial uncoordinated assessment can be done by AMI. In this situation, Initial Rapid Assessment (IRA) form from IASC is to be used so it can meet the uniformity criteria necessary to be used by other partners. Although not desirable, this situation is frequent on the initial response to large scale disasters, contributing for an overall incoordination of the response provided.

If any information gathered while assessing does not represent any harm to the affected population or any conflict with the humanitarian principles, it can and usually is shared with the coordination mechanism, so it can complete any gaps of information.

Table 7 shows some typically contacted entities and the related requests for information.

Table 7 – Requests for information

Entity contacted	Information requested	Information provided
Headquarter		
Embassy or other diplomatic representation	• General description of the situation • Legal entrance requirements	Intent of intervention in the affected country
Local Partner	• General description of the situation • Health infrastructures status • Engagement capacity of the organization to immediately respond to the disaster/what means are necessary to start or scale up the intervention • Logistical infrastructures status (airport, sea harbour, roads)	Intent of intervention in the affected country
Health cluster lead	• Entrance requirements for foreign medical teams • Entrance requirements for medicines and other medical equipment and devices	Intent of intervention in the affected country

Entity contacted	Information requested	Information provided
	• General information; situation report issued	
Field		
Health cluster	• Disaster magnitude, effects and already identified and uncovered needs or uncovered regions. • What is the plan? How can we best contribute on it?	Registration as an Health partner Our response capacity Foreseen intervention possibilities
Local Partner	• What is the evolvement of the partner in the response? • Can we include it on our response strategy?	Technical inputs for enhancing the immediate response by the partner

9.3 Decision Making

In the following section the decision making process will be described. Decision making links the assessment result with the ongoing or planned recovery and reconstruction activities in order to maximize the effect of the applied resources.

9.3.1 Definition/Scope

The following definition of the decision making is based on the paper from [7]. According to them decision making in the context of humanitarian aid means to answering four questions based on the assessments carried out:

(1) Whether to intervene or not,
(2) The nature and scale of the intervention,
(3) Prioritization and allocation of resources,
(4) And program design and planning.

These questions must be answered based on the four core principles for humanitarian aid: the protection of life, health, subsistence and physical security. "Though the humanitarian agenda cannot be reduced to these elements alone, they represent agreed priorities, and reflect a more general concern with alleviating suffering and preserving human dignity." [7]

Two decision making approaches can be differentiated. The first one is the needs-based approach and the second one is the so called rights-based approach. The two are different in kind, but in no sense incompatible. The rights-based approach situates the human rights at the very center of its processes and shifts focus of development from servicing needs to building capacity of individuals and communities to understand, claim and fulfil their rights.

The needs-based approach is by itself value-neutral (e.g. needs can be met or satisfied, needs can be ranked, and needs can be met through charity and benevolence) while a statement about rights involves a moral and a legal claim about entitlements (e.g. rights are respected, protected, or facilitated, human rights are indivisible, and charity and benevolence do not reflect duty or obligation). Needs-based decision making that is grounded in relevant evidence is recommended for donors and agencies equally.

9.3.2 Collaboration working needs

In order to enable different organizations to cooperate in the decision making process they need a common understanding of the current situation. Therefore they have to ensure that they rely on the same baseline and assessment information. But in order to come to the same conclusions even a common understanding and measuring standard of "need" is necessary for common periodization [7]. Nowadays this is very rare in practice e.g. "major actors (donors or NGOs) do rely on their own vertical, independent assessment" [1].

The improvement of the assessment and the dissemination of their information are crucial for the decision making. "In many of the most serious humanitarian situations, there was a lack of crucial information available to decision-makers, and the kinds of needs assessment

required to generate this are conducted only sporadically." [7] Hence improved needs assessment are a necessary condition for effective prioritization and appropriate response.

Periodization is necessary because the available resources are limited (which leads to an optimization problem) and not all activities can be performed parallel, because they are dependent from each other or external factors. In order to distribute the resource in the most efficient way a common assessment of the available capacities (technical resources, knowledge, staff etc.) is necessary. A simple example is the 3W-directory that is usually set up by UNOCHA immediately on-site after a crisis occurred.

9.3.3 Information structure

One major output of the decision making process is the recovery and reconstruction framework. According to [12], the recovery framework is "a synthesis of the sectorial and thematic early and longer-term recovery needs and priorities. It brings these together into a consolidated vision of how recovery and reconstruction should be undertaken based on the assessed impacts and needs, stating the overall recovery goals and objectives and providing indicative costs and monitoring indicators. The recovery framework provides a basis for the design and implementation of a comprehensive and coordinated set of recovery programs."

The recovery and reconstruction framework is summarized in a report covering the following aspects [12]:

- **Introduction and Background: Briefly describe the disaster event and broadly characterize the extent of damage.**
- **Pre-disaster Development Vision: Describe the pre-disaster development vision, highlighting major assets and deficits.**
- **Cross-cutting Issues: Briefly enumerate the important crosscutting issues for this recovery effort (these are more fully addressed in the sectorial sections).**
- **Guiding Principles for Recovery: Identify the recovery principles that ensure equitable, inclusive and sustainable development and that will guide the recovery process.**
- **Recovery Vision and Sector Introduction: Describe the vision for the re-established community by describing the area following the implementation of the recovery framework (incl. proposed timeline).**
- **Sectors: Provide an overview of each sector (incl. major needs according to PDNA, strategy and outcomes, timeline, response options, and resource requirements).**
- **Institutional and Legislative Framework: Describe how the government is organized to manage the recovery.**

- **Proposed Financing Mechanisms: Describe the overall plan for financing recovery including government programs, appeals, loans, and private investors (including insurance).**
- **Monitoring: Describe the monitoring plan for the sector.**
- **Key Assumptions and Constraints: Identify key assumptions and constraints affecting the degree of success in achieving sector and cross-sector outcome(s).**
- **Any Other Comments: This section is reserved for any additional comments or contextual notes.**

9.3.4 Decision-Making-Example by SGSP

In this section the involved DESTRIERO end-user partner Szkoła Główna Służby Pożarniczej (SGSP) outlines the collaboration working needs on a real example of its activities regarding "Decision-Making".

According to Polish law, during the crisis, local authority is responsible for coordination and decision making process. The level of the authority depends on the scale of the disaster.

If the scale of the occurrence is considerable, especially, when more than one province is involved, usually in-field headquarters will be organized instead of commanding "from the office". Representatives of all public services and other organizations are usually involved, becoming the advisory body for authority in charge of the operations and crisis management team.

As practice shows, during the response phase, the authority in charge is usually subordinated to the commander of fire and rescue operations done by SFS, though cooperating strongly in the field of logistics, civil protection, etc. There are two main reasons for that:

- Firemen are the only persons entitled by law to enter and operate within dangerous zone (with some exceptions),
- High rank fire officers are usually well-experienced commanders.

During the recovery phase, SFS usually will still be strongly involved, however taken up activities will depend mainly on the decision of crisis management centre lead by local authority.

The decision-making process is usually complex and its effectiveness is strongly dependent on the outcomes of the various analyses provided by particular teams working within the structures of the headquarters. As the leadership should be owned by a single-person, there is also a great responsibility for the team leaders to ensure the quality of provided analyses, ensure proper channels of communication and pre-filter information obtained from a number of sources, to avoid the overload of decision-makers.

Usually during the crisis there will be too much tasks to be performed and too less resources (both human and technical equipment) available. For that reason, the first steps during the decision making process would be the identification and prioritization of tasks. Usually

particular tasks might be divided into some problem groups, e.g. direct involvement in operations (like fighting the fire, technical rescue, search and rescue operations), evacuation of civilians, decontamination needs, dispatching additional resources (including requesting international assistance, support by different organization like Governmental Organizations, NGOs, International Organizations, etc.), operational reserves creation, widely understood logistics, critical infrastructure protection and recovery, communication (including internal between involved relief organizations and public information), etc.

The second step would be the creation of an implementation plan. Each task, or the responsibility for particular operational sector, should have own officer-in-charge. He will be responsible for successful completion of operational plan, as well as for delivering reports describing the progress to superior commanders. Each organization cooperating with public services during the crisis should have own liaison officer assigned. In other words, creating clear communication channels and single-person leadership within particular tasks is crucial.

The whole process must be iterative in order to achieve best performance.

Best performance of decision making process requires good quality of data, always reflecting current progress (or deterioration) of taken actions. Most important information is:

- Comprehensive analyses conducted by teams working within the headquarters.
- Completion level of particular tasks.
- If possible, receive updated information from the field, with the use of modern tools and advanced technologies (e.g. ALICE – Adaptive Layers for Information and Collaboration in Emergency – decision support and sharing operational picture).
- Human resources and technical equipment already involved in operations and their deployment.
- Human resources and technical equipment available immediately and after extended period of time.
- Recognized dangers and status of their reduction.
- Possibility of access roads to particular operational sectors.
- Status of rescue operations (e.g. during floods some people refuse to abandon their premises till the very last call).
- What kinds of organizations are already involved and what communication channels are set up.
- Information about already evacuated people, capabilities to satisfy essential needs
- Weather forecast.
- Pre-disaster agreements execution (will all necessary equipment, e.g. sand and sandbags, drinkable water, blankets, etc., be provided on time).
- Is any additional equipment necessary?

During the crisis the baseline information will usually origin from crisis management plans of particular administrative levels, as well as from databases being in possession of involved public services. Usually crisis management plans will consist of:

- The characterization of dangers recognized in particular area, including risk analysis.

- Identification of critical infrastructure.
- Risk maps and danger maps.
- First responders to be involved, including fire and rescue, medical services, social services, psychological support, etc.
- Rights and responsibilities of particular actors involved in crisis management.
- The list of resources planned to be used during operations.
- Procedures to be run during crisis (e.g. dispatch procedures, cooperation procedures, establishment of communication channels, monitoring of hazards, alarming).
- The list of previously concluded agreements serving successful completion of crisis management plan implementation (e.g. concerning the supply of various goods in case of the crisis).
- Priority list for critical infrastructure recovery and reconstruction in particular area.

The second important source of information would be the databases operated by various public services involved in crisis management. State Fire Service uses the decision support system (SWD-ST). At current state of development and implementation, every user of the system is able e.g. to monitor current status of resources subordinated to him, check the list of the available equipment, dispatch subordinated units and report the progress of operations.

There are also some further information concerning the infrastructure available (usually prepared prior to the crisis): Detailed information about local demography, topography, carrying capacity of bridges, height of bridges, viaducts, overpasses, tunnels, carrying capacity of roads. It might be crucial for planning crisis management activities.

Public accessed parts of crisis management plans prepared by particular authorities are available. It can easily be provided to other organizations involved in particular crisis and used as baseline information. However, this information is available only in Polish.

Some more sensitive information concerning crisis management and operational details are not publicly available in accordance with current regulations. However, some of them might be provided to organizations involved in crisis, if it is necessary to accomplish performed tasks. Detailed procedures should be described in crisis management plans of different levels.

Databases operated by different services involved in crisis management usually consist of sensitive information. Although technical aspects of providing this information to others will not be a problem, legal aspects seem to be more problematic.

If one of the operational information sharing systems will be used by headquarters during the crisis (as previously mentioned ALICE or similar), both technically and legally some information could be provided to involved organizations. It will though require further arrangements to be made in pre-crisis phase.

9.3.5 Decision-Making-Example by PSNI

In this section the involved DESTRIERO end-user partner Police Service of Northern Ireland (PSNI) outlines the collaboration working needs on a fictional example of their activities regarding "Decision-Making".

Brief description of typical activities:

- The main aspect of this activity is to ensure the decision made is based upon as much information as possible and that appropriate multi-agency consultation has been conducted, where possible.
- The Police Service uses the National Decision Making (NDM) model, which is suitable for all decisions situations. It can be applied to spontaneous incidents or planned operations by an individual or team of people. PSNI use this model to structure a rationale of what we will do and why. It will also be used to review decisions and actions taken within both the Gold (and SCG) and the Silver (and TCG).
- In a fast moving incident, the Police Service recognizes that it may not always be possible to segregate thinking or response according to each phase of the model. In such cases, the main priority of decision making is to keep in mind our overarching mission to protect and serve the public.

Information needed to inform this activity:

- The gathering of timely and accurate information and intelligence during an incident is vital. During this stage the decision maker defines the situation (i.e., defines what is happening or has happened) and clarifies matters relating to any initial information and intelligence. This in turn allows informed decisions to be made and recorded along with rationale.

Information already held:

- Again using the NDM, this stage involves considering what powers, policies and legislation might be applicable in this particular situation.
- Officers could ask themselves, what police powers might be required, is there any national guidance covering this type of situation, do any local organizational policies or guidelines apply and what legislation might apply?

Information we can technically/legally provide to others:

- Information is assessed using decision making as per the NDM. In a multi-agency approach, all front line responders are trained in this decision making model so information is shared on that basis.

9.3.6 Decision-Making-Example by AMI

In this section the involved DESTRIERO end-users partner Fundação Assistência Médica Internacional (AMI) outlines the collaboration working needs on a real example of their activities regarding "Decision-Making".

AMI bases its interventions by prioritizing assessed needs, framing it with the organization response capacity. Rights based approach is considered at decision making process as a cross-cutting issue that although mandatory to address will considered not as the central problem to address, but as a requisite to be attained.

AMI complies with the 4 principles of humanitarian aid: humanity, impartiality, neutrality and independence. Though usually there is no incompatibility when addressing rights based and needs based issues, there are certain situations where single addressing rights based problems, can conflict with any such principles, specially the one of neutrality. In this way, AMI centres it decision on the needs assessed, assuring that cross-cutting issues will be implied in the logic of the intervention.

For AMI the decision making process includes three levels of decision making: strategic, tactical and operational.

The strategic level of decision is taken at HQ level and includes decisions such as:

- Will AMI proceed or not with an exploratory mission in order to advance for a field assessment?
- If so, with what initial financial volume?
- Is a press release issued?
- Are the major donors to be contacted in the first emergency intervention or only on a second stage?
- Will a fundraising campaign be opened?

For the specific decision on whether to advance to the field in order to respond to a humanitarian crisis, key information is predefined and attributed with specific weight. All or most of the information needs to be gathered on assessment stage. This requisite is particularly relevant for strategic and tactical decision making process.

For an effective decision making, and after collecting all the necessary information, AMI uses an Emergency Decision Grid (see Table 8). This consists of a set of fundamental and preferential criteria, which are assigned weights for each it.

Table 8 – The Emergency Decision Grid

The Emergency Decision Grid	
Fundamental Criteria	**General Percentage Criteria**
The scale of the crisis	Up to 25 %
% of affected population	
Responsiveness of the country and neighbouring countries (geographical location)	
Gross daily rate of mortality after crisis	
Gross national income (World Bank)	
Human Development Index (UNDP)	
Request (or at least acceptance) of international aid for local government	Up to 10 %
Is there a request for international aid?	
Is there is acceptance of international aid?	

The Emergency Decision Grid	
International pressure to input humanitarian aid	
Minimum acceptable security conditions to gain entry, taking into account the AMI profile and its ability at this level	Up to 10 %
Possibility of access to the country/affected area	
Armed conflict	
History of kidnapping and/or killing of aid workers in the past 5 years	
Special safety advice	
Crisis with healthcare needs	Up to 10 %
Identified health needs of the country?	
Health cluster activated or other mechanism to coordinate health?	
Internal capacity to intervene (availability of human, material and financial resources to move forward in a short time)	Up to 25 %
Human Resources – Exploratory Mission	
Human Resources – Emergency Mission	
AMI has the financial capacity to advance with the mission? (assuming that it will not be possible any access any other source of funding)	
Possibility of external institutional funding	Up to 5 %
Ability to raise non-institutional funds in Portugal	Up to 15 %
Forecast of the raise funding campaign (media coverage of the crisis and availability of public donor)	
Private companies	
Preferred Criteria	**General Percentage Criteria**
Portuguese-speaking country	Up to 25 %
Countries with whom there is some historical or preferential relationship in Portuguese cooperation	
Countries where the AMI has ongoing, or has had, partnerships or missions	

The tactical and operational decision making process is taken at field level, tactical decisions are essentially related to the decisions made while the intervention is being designed, and the operational decisions concern the implementation of the already defined strategy and adaptation of the intervention to attain the best effectiveness possible.

For tactical decision making within the sectorial health response, the organization should, based on the information available, decide at which level of healthcare is more appropriate to act and whether to implement an health structure or a community based intervention, this decision is defined basically according to the interventions taken in place or planned by other humanitarian actors and available structure and resources that existed priory and resisted to the disaster. Mapping of the existing health structures and level of care provided is by this way of primary importance for decision making as well as 4W matrix –Who, Where, What and When (or 3W if 4W is not available).

Unfortunately 4W or 3W matrix is constructed after the response is initially established, taking to possible lacks of coordination at a first stage of the humanitarian response.

For this stage, provision of information about the decisions taken can be shared with actors as well, assuring nonetheless it will not endeavour against the humanitarian principles and will not cause any harm to the affected population.

The actors that intervene in humanitarian field usually guide themselves by the Sphere Handbook, which is a critical tool for decision making at tactical and operational level. It is the most widely known and internationally recognized sets of common principles and universal minimum standards in live-saving areas of the humanitarian response. It is considered another Quality & Accountability initiative that was established in 1997 by several organizations and agencies and defines basic intervention standards in four essential areas considered to be the basic humanitarian areas of needs: health, food and nutrition, shelter and water and sanitation. It is composed by standards, indicators, key actions and guidance notes. For instance, it indicates the minimum that should be delivered in any crises situation in terms of water, health services, food, shelter, etc.

Example from "The Minimum Standards – Health Systems":

- Minimum standard: People have equal access to effective safe and quality health services that are standardized and follow accepted protocols and guidelines.
- Key Action: Provide health services at the appropriate level of the health system. Levels include household and community, clinic or health post, health centre and hospital.
- Key Indicators: 1 basic health unit / 10.000 population; 1 health centre / 50.000 people; one district or rural hospital / 250.000 people, > 10 inpatient and maternity beds / 10.000 people.

Guidance Notes: Level of care: Health facilities are categorized by level of care according to their size and the services provided. The number and location of health facilities required can vary from context to context. Health systems must also develop a process for continuity of care. This is best achieved by establishing an effective referral system, especially for life-saving interventions. The referral system should function 24 hours a day, seven days a week.

Following the Haitian intervention example: AMI' strategic decision making on whether to advance or not, was decided positively since the overall score on the decision matrix was strongly rated. It was decided as well to proceed with a press release and to open a fund raising campaign for the emergency response. Major donors were engaged in discussion as well.

Two members from the HQ were immediately sent to Haiti via Dominican Republic (the Haitian airport was closed), with the purpose of performing an assessment and immediately prepare the arrival of the first medical team. Two days after, a foreign medical team was prepared and sent as well. The rationale supporting this decision results from the triangulation between the available information, with the push models already set, and the time distance amongst the assessment team and foreign medical team. Thus allowing enough time to design and prepare the first response.

At the time coordinated general assessment was still ongoing and so, no comprehensive and relatively detailed information was available. We must underline that in Haitian particular case many actors that were already in the country before the earthquake were strongly affected by the disaster, with many losses among their staff and with their offices destroyed. That is the case of humanitarian NGOs such as the international organizations, international authorities, such as the EU delegation (who's head of office passed away), the Brazilian UN militaries, besides the national and local authorities.

In our perception, the same situation led to a retainer effect upon the health cluster lead, which besides having being tragically stroke by the earthquake, was still recovering and simultaneously deploying new means for the response and by this, compromising the coordination facilitation.

Even though the health cluster lead was a key informant on flagging out one of the health structures that AMI would end up having an action, this process lasted for 3 days.

Tactical decision took place when defining hospital level of healthcare, and focused our efforts in working on simultaneously on an already pre-existing hospital (damaged but functional) and a recently established field hospital.

9.4 Recovery/Reconstruction

In the following section the actual recovery and reconstruction activities are in focus. The previous phases are necessary for the planning of these activities. On the other hand the execution of the recovery and reconstruction activities influences the ongoing planning activities.

9.4.1 Definition/Scope

As stated in section 8.3 (early) recovery is the set of decisions and actions taken after a disaster. More precisely, early recovery is "a multidimensional process of recovery that begins in a humanitarian setting. It is guided by development principles that seek to build on humanitarian programs and catalyse sustainable development opportunities. It aims to generate self-sustaining, nationally owned, resilient processes for post crisis recovery. It encompasses the restoration of basic services, livelihoods, shelter, governance, security and rule of law, environment and social dimensions, including the reintegration of displaced populations." [5]

Recovery can be defined as "a focus on how best to restore the capacity of the government and communities to rebuild and recover from crisis and to prevent relapses into conflict. In so doing, recovery seeks not only to catalyse sustainable development activities, but also to build upon earlier humanitarian programs to ensure that their inputs become assets for development." [21]

Reconstruction represents "actions taken to re-establish a community after a period of rehabilitation subsequent to a disaster. Actions would include construction of permanent housing, full restoration of all services, and complete resumption of the pre-disaster state." [16] (see section 8.3).

9.4.2 Collaboration working needs

All recovery and reconstruction activities must at least be coordinated inside the so-called cluster approach of the UN. The approach defines nine areas of activities that need leadership and accountability, and distinguishes between technical areas (these are nutrition, health, water sanitation and hygiene, and emergency shelter), cross-cutting areas (these are camp coordination and camp management, protection, and early recovery) and common services (logistics and emergency telecommunications). Agriculture and education were added later, leading to a total of 11 areas or clusters [27].

In the daily work of recovery and reconstruction, organizations can cooperate in different fields e.g. in regulatory processes like the design and regulatory approvals for the reinstatement of damaged facilities [18]. Also cooperation in information technologies is thinkable like common networks and data repositories [2] [8]. The sharing of knowledge between different actors as well as the knowledge transfer to local authorities like the government or local NGOs before leaving the crisis situation is also an important field for cooperation [1] [2]. Shared knowledge helps to build and improve (local) capacities and can be crucial. Also collaboration can help to share capacities across actors and thus maximize their utilization.

Recovery and reconstruction activities cover following areas [5] (given examples are not complete):

- **Livelihoods and income recovery: Restore and reinstate remittance facilities; Protect and rehabilitate productive assets (fodder production, animal health, management of natural resources); Establish and conduct capacity building of Emergency Employment Service Centres.**
- **Social Services: Ensure basic rehabilitation of primary social services, such as health care facilities, schools, community centres, water and sanitation networks, considering both hard and software so as to promote the sustainability of the services.**
- **Displacement, return and reintegration: Enable displaced communities to assess conditions in their home areas and to plan their return together with receiving**

communities and support the return and reintegration process, promote livelihood, capacity building and community-based responses.

- **Shelter: Assess shelter damage, capacity and needs; Train local artisans in hurricane, earthquake and flood resistant building techniques; Identify national building regulations in recovery shelter, and review building codes and enforcement.**
- **Land and Property: Undertake land and property situation analysis; Safeguard land and property registers in emergency situations; Build capacity for restitution mechanisms.**
- **Coordination: Assess the capacity of national and local authorities to lead and coordinate early recovery efforts; Support local authority coordination and advocacy for early recovery, with an emphasis on basic service delivery.**
- **Cross-cutting issues: Mainstream cross-cutting issues (e.g. gender, HIV/AIDS, environment, age, human rights, disaster risk reduction, conflict prevention) in all aspects and stages of early recovery programming, particularly in assessments, program planning, implementation, and evaluation of early recovery programs.**
- **Infrastructure: Support environmental clean-up, debris removal and rehabilitation; Restore critical minor infrastructure at the community level that is essential for initiating local recovery processes through labour intensive technologies and micro enterprises that generate employment.**
- **Security: Provide satellite imagery based security situation maps (security hot spots and safe havens); Conduct safety surveys based on representative samples of the population; reduce insecurity through early mine action interventions.**
- **Governance: Assess the capacity of national and local authorities to lead and coordinate early recovery efforts; Rehabilitate essential government facilities and provide material and equipment support (e.g. office equipment); Strengthen natural disaster institutions.**
- **Rule of Law: Carry out minor rehabilitation of infrastructure, such as traditional courts, police stations, police training centres, and correction facilities; Train international and regional peacekeepers/police to address the need for protection of civilians and build the capacity of their local/national counterparts in the security sector and of non-state armed actors.**
- **Natural disaster response: Conduct rapid mapping activities (e.g. hazard mapping, structural, environmental and agricultural damage assessment); Prepare and disseminate risk reduction guidelines for all reconstruction projects; Prepare and disseminate risk reduction guidelines for all reconstruction projects.**

Insides these areas different collaboration needs can be identified e.g. cooperation with local authorities and local stakeholders in order to support the local recovery process; cooperation

with governmental organizations at different levels for the national capacity building; or cross sectorial cooperation in order to address cross-cutting issues.

9.4.3 Information structure

Since the recovery and reconstruction activities are based on the previous steps the information structure is a combination of all previous structures. Independent of the origin of the information (baseline, assessment, or decision making) all kinds of information are processed in this final step. Also the gathered, used or analysed information during the recovery and reconstruction activities will (ideally) be used as an information input for the previous steps. This idea is known as the information management cycle [4] and can be applied to crisis information management (e.g. [3]; [23]).

In order to establish the patterns of information flows among the crisis response organizations [17] identified the following types of information relevant to the crisis response process (Table 9).

Table 9 – Types of crisis response information [17]

Information Element	Crisis Information Content
Personnel Status	Registration of personnel, exact location of personnel, and personnel tracking system. Personnel with first aid and fire rescue experiences.
Infrastructure	Location of emergency aid equipment. Details of crisis management system specifications, e.g., hardware and software. Established physical communication networks such as telephone and radio.
Crisis Management and Notification	Emergency plans and organization, emergency preparedness practices, and existence of test scenarios. Communications within rescue organizations, such as report lines between rescue leader, assistants, rescue personnel, press, and public administration.
Area Access	Geographical information such as infrastructure, one-way streets, blocked access routes, road barriers, parking, and helicopter landing areas.

[23] lists the following standard information management products with respect to their relief operations (Table 10).

Table 10 – Standard information management products [23]

Information Product	Description
Contact Directory	The Contact Directory is a kind of 'telephone book' for humanitarian and other organizations involved in the crisis, and includes for example: • UN Agencies and Missions • NGOs (national and international) • Government Offices • Donors

Information Product	Description
	It is intended to facilitate communication between organizations by providing the necessary contact coordinates. Contents would typically include: • Organization Name • Physical address (may have multiple field locations) • Office Telephone, Fax, Email • Key staff titles and names, telephone number(s), email
Who does What Where (3W)	The 3W records and presents humanitarian response activities categorized as follows: • WHO: Identity of organization undertaking the activity • WHAT: Type of activity • WHERE: Location where activity is undertaken Because the 3W tracks the humanitarian response in detail and can present the information at various levels of detail from operational to strategic overview, it can be useful in a variety of ways: • as an overview of the humanitarian response • as a tool for identifying gaps and duplications in the response programs • as a tool for sectorial analysis and coordination • as a tool for identifying synergies between organizations and activities
Meeting Schedules	OCHA offices provide a service to the humanitarian community by compiling, processing and disseminating information on coordination meetings. The Meeting Schedule is a simple yet very useful Coordination tool consisting of the timing, location and function of meetings to be held either in a specified period or on an ongoing basis. The Meeting Schedule is particularly useful in helping newcomers to identify necessary coordination fora.
Operation Maps	Much humanitarian data has a geographic component, and maps are a very effective means of communicating a large amount of data in a simple form. Maps complement other information very well - street plans of the capital can complement the Contact Directory by showing office locations; topographic maps of the country supports the available background information; administrative boundary maps help people to understand the political and social set-up of a region.
Briefing Materials	Briefing humanitarian actors has been one of the most valued services provided by OCHA Field Offices. Particularly important in a crisis period or its immediate aftermath are logistics information (e.g. access routes, stock levels and status of supply pipelines, road conditions) and security reports that give more in-depth context and analysis than briefings provided by Security Officers.

9.4.4 Recovery/Reconstruction-Example by SGSP

In this section the involved DESTRIERO end-user partner Szkoła Główna Służby Pożarniczej (SGSP) outlines the collaboration working needs on a real example of its activities regarding "Recovery/Reconstruction".

It should be emphasized that the recovery process begins on the day of the emergency. All the information concerning the operations should be used as a baseline for recovery planning.

During the recovery and reconstruction phase, local authority is in charge of all activities. In case of some major occurrences, SFS will still be strongly involved, as there are a number of vital tasks to be accomplished.

According to the definition given in previous section, recovery and reconstruction phase aims at restoring the quality of life of local community. In the holistic approach, main aspects as follows should be considered:

- Infrastructure: Prioritization should be made, which elements of infrastructure should be restored in particular time horizons. Usually impassable roads are crucial to be taken into consideration when planning recovery. If private houses were destroyed, people will not be able to get back to normal life before they don't have their houses restored. Ensuring economic sustainability, some industrial infrastructure must be restored. If agricultural areas were affected, there is a need to restore food production potential. Moreover, some public buildings will constitute a part of critical infrastructure.
- Social aspects: A number of people have suffered during the crisis. They were exposed to hazards, so restoration of healthcare will be one of the most crucial tasks. Also increased demand for pharmaceutical supplies should be expected. Also psychological support might be necessary for those who were traumatized during the crisis. Special care institutions might also be involved in particular area. If all activities were complementary, the sense of safety within the community might be restored more easily. In case of biological contamination, additional vaccine programs might be necessary to introduce.
- Contamination: If contamination has taken place, it might require enormous resources to deal with decontamination process, but also for basic needs satisfaction e.g. supplying drinkable water, food, clothes, equipment.
- Natural environment: It is important to restore particular natural environment. Waste policy should be introduced as fast as possible, as it is crucial for inhabitants' health. Another example might be the restoration of biodiversity and local ecosystem.

Information crucial to perform activities during recovery and reconstruction phase is as follows:

- Acknowledging available resources and capabilities.
- Acknowledging the profile of people who have suffered from the crisis, with regard to special needs of some of them.
- Having latest information concerning the impact of the disaster.

- What kind of organizations work in the field (both local and international), and what are their capabilities.
- Are set up communication channels appropriate (both internal and external)
- Does cooperation with foreign actors is sufficiently effective, or an intervention is necessary.
- Temporary housing and for how long it might be used.
- Founding possibilities.
- The involvement of media.
- Detailed information about contaminated areas (if applicable).
- Derivative threats for people and natural environment, their development and influence mechanisms forecast as well.
- Are there any special needs concerning time horizons of reconstruction/recovery.

Information from crisis management plans and critical infrastructure protection plans, e.g. detailed information concerning location, object characteristics, plans, functional connectivity with other objects (including critical infrastructure), installations, services; how does malfunction of particular element of critical infrastructure affects other in particular area and possible preplanned activities to counteract; resources to be used from different administrative levels, preplanned scenarios of critical infrastructure recovery, cooperation procedures with public administration of different levels, including crisis management centres.

During the recovery and reconstruction phase information which is in possession of involved actors usually depends on how effective the activities during relief phase were. All other information was available pre-disaster.

Theoretically it is possible SFS will provide following information to other actors:

- Information sent to headquarters, crisis management centres and media by field commanders.
- Reports and analyses about relief activities done by SFS.
- Press releases prepared by SFS and crisis management centres.
- Historical data that origin from internal databases of particular services.
- Reports from national crisis management drills in public administration.
- Major Accident Prevention Policy of the companies of different tier (according to SEVESO directive).

It must be mentioned that described sources of information might consist of sensitive data of different level (restricted or confidential). In that case information might be provided only to a very specific group of actors involved in the recovery and reconstruction activities. Additional agreements for information sharing might also be required.

9.4.5 Recovery/Reconstruction-Example by PSNI

In this section the involved DESTRIERO end-user partner Police Service of Northern Ireland (PSNI) outlines the collaboration working needs on a fictional example of their activities regarding "Recovery/Reconstruction".

Brief description of typical activities:

- An impact assessment would be conducted in order to establish this information.
- Early decisions made need to be taken on what the new normal looks like and will affect the recovery. Therefore, such decisions must be made by the correct people, using the Integrated Emergency Management (IEM) model and in consultation with members of the SRG.
- Policing provides Gold, Silver, Bronze command structure to deliver the Strategic Aim, however, there is a need to ensure the lead agency for recovery is identified and agreed at an early stage.

Information needed to inform this activity:

- The post-incident baseline and subsequent updates are needed to inform recovery planning to ensure during the Relief Sub-Phase humanitarian efforts do not fail and result in a second emergency.
- Costs relating to the repair of critical infrastructure and lead in times for that repair are needed.
- An impact assessment would be conducted in order to establish this information.

Information already held:

- Local and National Emergency Planning Guidance informs this aspect along with previously conducted impact assessments, either from incidents within the UK or similar incidents internationally.

Information we can technically/legally provide to others:

- All relevant information required for decision making with agreement by multi-agency partners through the SCG.

9.4.6 Recovery/Reconstruction-Example by AMI

In this section the involved DESTRIERO end-user partner Fundação Assistência Médica Internacional (AMI) outlines the collaboration working needs on a rea) example of their activities regarding "Recovery/Reconstruction".

The transition from an humanitarian emergency status to post-emergency is explained through the public health point of view by the recovery of the over doubled crude mortality rate (emergency status) to a threshold of values between the baseline mortality rate of the population before the disaster, and the double of it. The situation is considered fully recovered or fully controlled when the mortality rate meets its previous values before the disaster, for the same population.

While in emergency stage, AMI centres its efforts on relieving the effects of problems caused by the disaster, while in post emergency stage, it´s causes should be addressed.

This transition requires for a more extensive information collection thus allowing the implementation of interventions more focused on the context, shifting from a push approach, to a pull approach common to development interventions.

In order to proceed with a transition of the planning methodology, a positive evolution of the situation must occur and regular monitoring information needs to take place. Thus the participation in cluster meetings (that still happen at this stage, although not necessarily at a daily basis as in the immediate aftermath of the crisis) becomes a necessity throughout the intervention, analysing the patterns of change and proceeding with consequent adaptations.

The mapping of the response that overtime is more complete, allows the humanitarian actors to gain deeper knowledge and understanding of the response evolution, despite this process can be seen as a favourable situation, Recovery and reconstruction can still find barriers to their implementation.

Has an example for the health sector, the restoration of the health services to the same baseline level previous to the disaster may face serious constrain if the disaster affected not only the health structures but (and specially) the amount of health workforce as well.

Expecting a delay in this transition process, the emergency health services remain functional, although adapted to the new health care needs that are expected to be more cantered at primary healthcare level. Meanwhile in other sectors, recovery and reconstruction might already be ongoing.

By this we consider that at this stage, the information requirements need to be more detailed and to be withdrawn by the context itself. Humanitarian actors, fully engaged with the coordination mechanism, feed the information system, leading them into new decision making processes. The cluster lead as a key role in this process.

As for AMIs dissemination of information, weekly reports are made, referring to the evolution of the situation, activities ongoing, barriers or other problems found and gaps that still need to be addressed as well. This report is to be shared with the cluster lead and other sector partners. AMI will never share personal information of their beneficiaries, through the principles of protection and ethics in health care.

10 Critical paths, dependencies and challenges

This chapter provides a summary of identified critical paths, dependencies and challenges regarding collaborative working needs. In general the critical path is defined as the longest necessary path through a network of activities when respecting their interdependencies. In the context of this paper the critical path might also be understood as the weakest and most vulnerable dependency between activities or information flows.

A generic illustration of these information flows is provided by the information management cycle [4]. Like briefly mentioned in chapter 9.4.3 this cycle has been adapted in different ways to the crisis information management (e.g. [3]; [23]). Such an adopted cycle is shown in Figure 13.

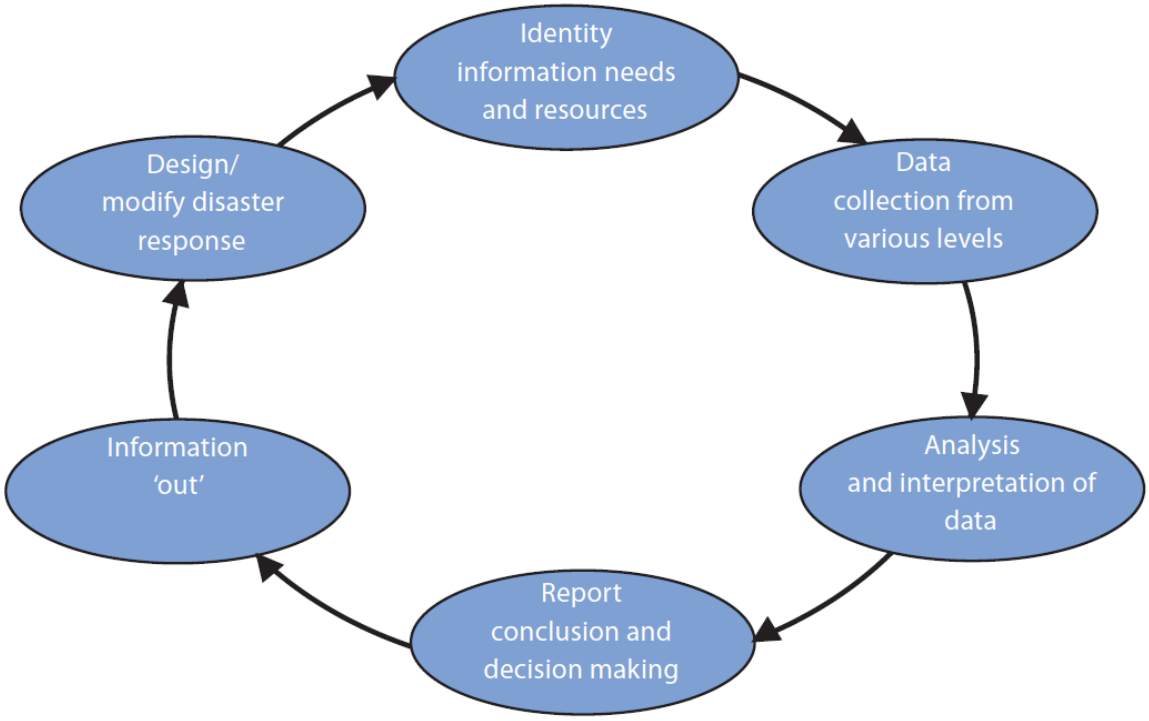

Figure 13 – The information management cycle [3]

Based on Figure 13 some of the critical paths and dependencies can be derived:

- **Assessments (data collection) are needed for decision making: Before recovery and reconstruction planning can take place initial assessments have to be done.**
- **Data analysis is necessary for reports: To fulfil the request for reporting assessment data is needed in several levels of detail and must be interpreted.**
- **Define the information need for the decision making: In order to receive relevant information via assessments the information requirements must be defined.**
- **Provide a closed loop: Information which is gathered, used or analysed during the recovery and reconstruction activities must be used to identify information needs.**

- **Baseline is needed for monitoring: If baseline information is missing monitoring and modifying disaster response is not feasible.**

With reference to the four major steps the first challenges is the collection of pre-disaster baseline data. While some actors consider it important in order to facilitate the recovery and reconstruction activities others doubt the cost-benefit-relation due to the rapid changes in data. Nevertheless, an overview of the existing baseline data and good pre-disaster hazard, vulnerability and risk analyses are required for the needs assessment.

The surge of actors and their assessments can lead to assessment fatigue at the end of those being assessed. Recovery assessments are sandwiched between emergency and reconstruction assessments and might be considered as unnecessary. Besides this the appropriate timing for assessments is an area of contention. For the affected population it can be too early to comprehend recovery and reconstruction when they grappling with day to day survival and emergency needs. The NGOs have immense pressure from their donors to submit project proposal and thus prefer early assessments.

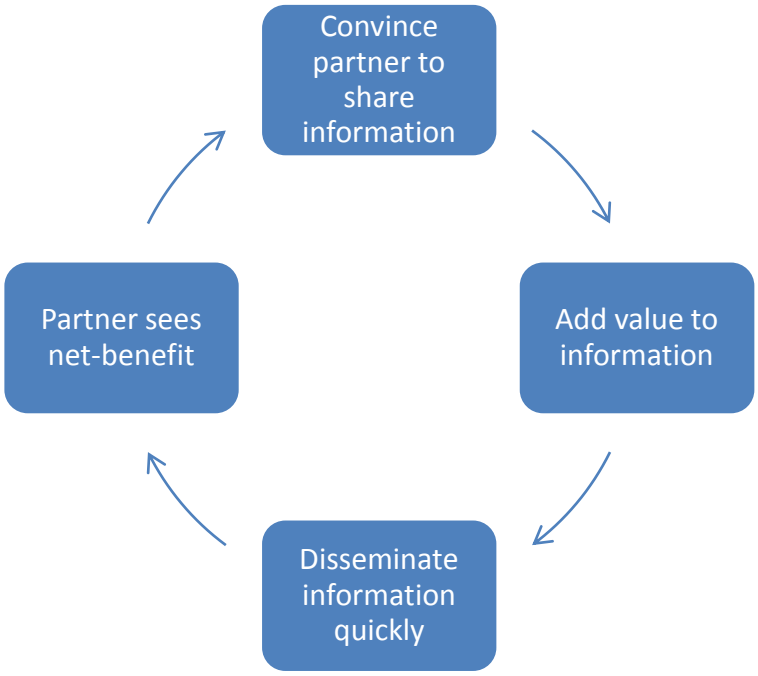

Figure 14 – The virtuous circle of information exchange (based on [23])

In the wake of the disaster the local government is often weak which can lead to a lack of coordination between the sectors and actors involved in recovery and reconstruction. Thus the decision making will lead to isolated and uncoordinated interventions. And since recovery is primary a local process it is also negatively affected by weak national capacities.

A general problem regarding information management for collaborative needs is the fact that the wording and timing referring to the different post-disaster phases are not homogenous across the actors (and their systems). Therefore there is a huge ambiguity in the meaning and use of core terms like recovery, reconstruction, needs, demands and standards.

Like shown in Table 2 most organizational coordination barriers are non-technical and thus cannot be addressed and solved only with information systems. [23] describes one approach to address some of these. Figure 14 represents the principle of reciprocity on which information exchange largely rests: potential partners will be encouraged to share data if they ultimately see (or tangibly receive) a benefit for having done so.

11 Recommendations

In summary we can derive the following collaborative recommendations for DESTRIERO from the collaborative working needs:

- The DESTRIERO concept should support different NGOs working together on their separate, yet compatible, missions. Thus the DESTRIERO system must not influence the information systems and procedures of the organizations. Instead it should provide loose coupling and deal with heterogeneous information systems.
- The information owner must be capable to decide what information to share or not. Hence it is important in the DESTRIERO concept to differentiate between the information an organization has and the information it is willing to share.
- The focus of the DESTRIERO concept and system should be the inter-organizational collaboration specifically between NGOs. The intra-organizational collaboration should be unaffected.
- For the establishment of baseline information the DESTRIERO system should be capable of handling the Common Operational Datasets (COD) which are usually provided by UNOCHA.
- The DESTRIERO system should be able to manage and track information needs expressed by organizations in order to satisfy their information needs in the future if possible.
- Coordinated assessments should be supported by the DESTRIERO concept. For instance the DESTRIERO system should allow compiling comparable data into a single database for a shared analysis (harmonized assessments).
- The DESTRIERO system should calculate and present indicators for recovery and reconstruction in order to assess and monitor the disaster impact. These indicators might have their origin outside the DESTRIERO system.
- The DESTRIERO system should support decision making by administer potential measures. For this purpose it should help to keep track of priorities and monitor activities in the field.
- The DESTRIERO system should support the day to day routines with reporting functionalities like enriched maps, quick data analysis or data aggregation.

12 Conclusions

The resulting user requirements stated in this document will be the main input for several design and development phases of the project as WP3 (Technological interoperability), WP4 (Functional interoperability) and WP5 (Architecture Design). The above dependences are shown in figure 13, section B1.3.8 of the DoW.

A detailed list of user requirements classified according to different categories is described along this document. That information was gathered through different tools and methodologies, e.g., questionnaires, surveys and interviews with end users during a cellebrated workshop. Up to 50 questionnaires were sent to end users to be filled in, whereas 21 answers were received from very heterogeneous users

Most of the end-users have some experience in performing studies or trainings in the field of PDNA or RRP, but also a representative number of them indicated that their experience in this area was low or none. Most of respondents had no collaborative work system and do not use collaborative work tools for PDNA/RRP but the big majority had field collaborative experience with other organizations and most of them declared that some of these organizations were from another country.

According to the respondents' opinion gathered through the questionnaires and the workshop, main conclusions about DESTRIERO scope and general requirements are as follows:

- The analysis tool and the information system are the two most important technical capabilities necessary to PDNA/RRP, but the organizational and individual capabilities (human resources, cooperation, knowledge …) are more important than the technical ones
- Crucial information sources for PDNA/RRP decision-making are: human, professional and written sources. After the emergency management phase, the most important areas are: information exchange and the decision-makers information
- DESTRIERO system should provide information whether there is a risk assessment plan for a particular region or not. Furthermore, it could be a problem sharing information – some data could be very sensitive and thus some organizations may be unwilling to share it
- Some recovery procedures require political decisions about the resources to be used. It would be good to have information about possible risks that could happen in the future (in the particular region)
- DESTRIERO should facilitate communication on higher level of activities coordination.

In addition, DESTRIERO needs to involve as many potentially participating agencies in recovery and reconstruction processes as possible. In particular those ones more related to the defined scenario (as an energy agency, considering that there is a nuclear plant in the event). To achieve this goal, during the project execution dissemination actions within the scope of the

activities of WP9 (Exploitation and Dissemination) will be carried out by the partners, in special by those that are end users.

New comers to the user's community will be encouraged to enrich user's requirements through their contributions and suggestions. This process will be followed up through task T2.5 "User requirements tracking".

In terms of collaborative working needs, main recommendations, user requirements and conclusions for DESTRIERO system design are the following:

- It must not influence the information systems and procedures of the organizations. Instead, it should provide loose coupling and deal with heterogeneous information systems
- The information owner must be capable to decide what information to share or not. Hence it is important in the DESTRIERO concept to differentiate between the information an organization has and the information it is willing to share
- For the establishment of baseline information, DESTRIERO should be capable of handling the Common Operational Datasets (COD) which are usually provided by UNOCHA
- System should be able to manage and track information needs expressed by organizations in order to satisfy their information needs in the future if possible
- DESTRIERO should allow compiling comparable data into a single database for a shared analysis (harmonized assessments)
- System should support reporting functionalities like enriched maps, quick data analysis or data aggregation

13 ANNEXES

1. DESTRIERO USER REQUIREMENTS QUESTIONNAIRE

2. INTRODUCTION

This questionnaire is a part of the requirements collection phase of **DESTRIERO project.** DESTRIERO is a project within the Seventh Framework Programme (FP7), which is funded by the European Commission, addressing SEC-2012.4.3-1 **Next generation damage and post-crisis needs assessment (DPNA) tool for reconstruction and recovery planning (RRP).** More specifically, DESTRIERO addresses the possible scenario in which is needed to undertake the recovery and reconstruction phases after a big disaster. The purpose of this questionnaire is to better understand end-user requirements and needs related to the scope of DESTRIERO.

The DESTRIERO consortium—particularly all those organizations involved in gathering, processing and analysing end-user needs—fully understand the sensitive nature of the subject and will not include any information arising during an interview that is not suitable for the public domain.

At the same time, all interviewees' personal details will remain anonymous and 'firewalled'.

Instructions

Please complete the form selecting the importance (0 is the lowest importance and 4 is the highest importance) of the following requirements:

0 -> Unimportant requirement. With or without this the system is exactly the same.

1 -> Wish requirement. Nice to have, but the system will be fully useful even without it.

2 -> Important requirement. Without this the system will be only partially useful.

3 -> Serious requirement. Without this system will be usable but not useful gadget.

4 -> Critical requirement. Without this system will be unusable at all.

3. QUESTIONS

4. ORGANIZATION

1. Name:
   a. Name
   b. Organisation
   c. Title
2. Organization type:
   ☐ Public services
   ☐ Police
   ☐ Civil protection
   ☐ Security forces
   ☐ Commercial organizations

☐ Academia and R&D
☐ Public bodies
☐ NGO
☐ Other

5. GENERAL NEEDS AND GAPS OF YOUR ORGANIZATION THAT COULD BENEFIT FROM DESTRIERO

Do you perform any particular study/trainings in the field of PDNA/RRP?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Does your organization have a **systematic knowledge** about any PDNA/RRP and/or any **collected lessons learnt** from the past catastrophic events?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

What are the most important capabilities (e.g. sensors, devices, human or technical resources, procedures, knowledge, etc.) necessary to PDNA/RRP?

Technical capabilities

Sensors	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Devices	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Technical resources	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Information system	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Analysis tools	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

Organizational and individual capabilities

Human resources	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Procedures/Policing	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Cooperation	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Open Intelligence	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Knowledge	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Awareness	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Proactivity	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Mindset	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

Other

Luck ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Is there a collaborative work system within your organization that keeps track of which capabilities/resources are currently available for PDNA/RRP?

Does your organisation use collaborative work tools for PDNA/RRP?

Yes ☐ No ☐

In affirmative case, which (or which type of) tools are used?

Could you please point out gaps and/or limitations (if any) related to used tools?

Do you have had field collaborative experience with other organizations?

Yes ☐ No ☐

In affirmative case, were such organizations from the same country or different countries?

SAME ☐ DIFFERENT ☐

What have been the major issues regarding national and/or international cooperation/communication aspects?

Language ☐
Procedures ☐
Communication cannel ☐
Data format ☐
Others (please describe)

Type/Sources **of information crucial for** PDNA/RRP **decision-making**.

Information sources

Written sources	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Human sources	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Channels for alerting	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Professional/reliable information sources (experts, mass media)	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Non-professional/unreliable information sources (population, social networks)	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

Information available before the catastrophe

Information about emergencies	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Training	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Scientific researches	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Information about location	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Society observations	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Intelligence	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

Information produced during the emergency management phase

Severity of catastrophe/ type of catastrophe	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Time of catastrophe	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Teams on the field information	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Common operational picture	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Surveillance / sensorial information	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Information about emergency event	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Announcements of government agencies	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

After emergency management phase

Decision-makers information	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Information exchange	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

Main challenges in the decision making process related to PDNA/RRP activities.

Political, organizational challenges

Lack of a politically motivated decisions	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Limited equipment and human resources, money, tools	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Restricted self-reliance resulting from the hierarchical dependence	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Cooperation with media and public	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Lack of most vulnerable assessment needs	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

Situation awareness challenges

Usage of open sources and public information	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Information obtaining, gathering and analysis	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Information fusion	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Information overload	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Lack of meaningful Key Performance Indicators (KPI)	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Lack of overall, comprehensive view of situation	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Lack of information on most vulnerable needs	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

6. GENERAL REQUIREMENTS

Requirement	DESTRIERO should produce a situation awareness of the whole area
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO should integrate different types of sensors, including mobile ones.

Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO should support a wide variety of recovery/reconstruction situations
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO outdoor and mobile devices should be weatherproof
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO system should be scalable, modular and flexible
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO should offer simple interfaces to share data with external organizations
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO should provide the emergency procedures and protocols to apply in a recovery/reconstruction situations.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO system should allow the easy integration of unattended sensors
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO system should integrate information flows from satellite devices like SAR for earth resources visualization
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4
Requirement	DESTRIERO system sensors data should be visible on each DESTRIERO node
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO system sensor measurements should feed DSS system
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO system should incorporate CBRN sensors
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO should allow messaging capabilities from/to nodes in the hot-spot.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO should be easily deployable and simple to dismantle.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

If you consider relevant/important some requirement, which is not stated in the list, please describe it:

7. DATABASE AND STORAGE REQUIREMENTS

Requirement	DESTRIERO users should be able to access stored data easily
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO should store all data gathered during a recovery/reconstruction situations
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	Only authorized DESTRIERO users should access to the DESTRIERO data
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	Access to stored data should be done by means of an authentication process
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO system should provide means to use stored data for a post crisis playback of what happened.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO system should use existing standards for data storage and management.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO system should be capable of using and/or integrating with existing legacy databases.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO should use data mining techniques
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

If you consider relevant/important some requirement, which is not stated in the list, please describe it:

8. COMMUNICATION REQUIREMENTS

Requirement	DESTRIERO communications should be reliable
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO communications should allow prioritization of data flows and of procedures
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO communications should coexist with the existing communications without affecting them

Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4
Requirement	DESTRIERO communications technologies should be seamless to its users
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO communications should allow high priority data
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO communications should relay on standards. It includes standard Commercial Off-The-Shelf COTS hardware as well as standards for protocols.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO communications should allow interoperability (hardware, software and of procedures) among systems of different agencies and nations.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO communications should allow the integration, as far as possible, with existing legacy systems.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO communications should work, partially, even if a catastrophe destroys existing communications infrastructure.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4
Requirement	DESTRIERO should work offline when communications are lost.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO should include mechanisms for ensuring its communications channels
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

If you consider relevant/important some requirement, which is not stated in the list, please describe it:

9. HMI REQUIREMENTS

Requirement	DESTRIERO console should provide a shared situation awareness picture
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO console should show the recovery/reconstruction teams location
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO console should show geographical information
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO console should show meteorological and environmental information
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO console should allow map selection, distance measurements, zooming and scrolling
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO console should be accessible from remote locations including mobile devices
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO console should show a map of devices and links status, updated in real time, to know the availability of devices in each time.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO console should show resources location

Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO console should show Decision Support System (DSS) system inputs, management and results
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4
Requirement	DESTRIERO console should be very simple usage
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	No DESTRIERO console action should require more than 4 clicks
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO console action should permit usage on touchable screens
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO console should be intuitive for operator.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO should show the current status of its operation, should visualize how it works. It should also show in what step of the processing it currently is.

Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

If you consider relevant/important some requirement, which is not stated in the list, please describe it:

10. HARDWARE REQUIREMENTS

Requirement	DESTRIERO should work in common COTS hardware like Intel x86 based architectures computers
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO should use COTS networking hardware.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO, for handheld devices, should work in common architectures like Reduced Instruction Set Computer (RISC).
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

If you consider relevant/important some requirement, which is not stated in the list, please describe it:

11. ETHICAL REQUIREMENTS

Requirement	DESTRIERO should store sensitive data securely.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO should meet EU regulations and national laws regarding sensitive data.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

If you consider relevant/important some requirement, which is not stated in the list, please describe it:

12. COLLABORATIVE WORK REQUIREMENTS

Requirement	DESTRIERO should enforce the collaborative work among members of different agencies
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO should boost collaborative work to enhance productivity
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO should delimitate procedures intra and inter agencies to specify tasks.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Requirement	DESTRIERO show bound and automate work flows inside and between recovery and reconstruction agencies.
Importance	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

If you consider relevant/important some requirement, which is not stated in the list, please describe it: