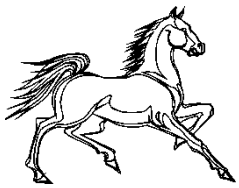

DESTRIERO

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

D2.3 – State of the Art of Needs Assessment Tools for Reconstruction and Recovery

Grant Agreement no.: **312721**
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Version:	1.0
Document Description:	The document report contains an assessment of a list of tools and knowledge bases that are potentially relevant for Post Disaster Needs Assessment (PDNA) and assesses their suitability for use in line with the aims of the DESTRIERO project.

Revision History

Version Number	Description	Date Modified	Author
1.0	First Release	23rd December 2013	E.Crean A.Coyle

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LIST OF TABLES

1 INTRODUCTION

1.1 Document Organisation

This document report is presented under the following Sections:

1. Describing the **Scope** of the task.
2. Outlining the initial **Objectives** of the task and how they changed as the task evolved.
3. Research and analysis of **Tools & Knowledge Bases** for reconstruction and recovery.
4. Describing the **Evaluation** techniques undertaken during the task.
5. Outlining **Conclusion**.

1.2 Reference Documents

Document name	Reference number
[1] UNDP, Bollin, C. and Khanna, S (2007), "Review of Post Disaster Recovery Needs Assessment and Methodologies", available at: http://www.saludydesastres.info/	
[2] DESTRIERO – ANNEX 1: Description of Work	Grant Agreement n° 312721
[3] DESTRIERO User Requirements Questionnaire	
[4] 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.	
[5] Inter-Agency Standing Committee (IASC) (2012), Operational Guidance for Coordinated Assessments in Humanitarian Crises.	
[6] Bander, M (2006), "Quantitative Methods for Software Selection and Evaluation", available at: http://resources.sei.cmu.edu/library/asset-view.cfm?assetID=7949	
[7] Casley, D,Kumar, K (1989), "The collection, analysis and use of monitoring and evaluation data". Baltimore, MD :The John Hopkins University Press, available at: http://econ.worldbank.org/external/default/main?pagePK=64165259&t	

Document name	Reference number
heSitePK=478060&piPK=64165421&menuPK=64166093&entityID=000178830_98101901472111	

1.3 Table of Acronyms

Acronym	Description
DALA	Damage and Loss Assessment
ECLAC	Economic Commission for Latin America and the Caribbean
GFDRR	Global Facility for Disaster Reduction and Recovery
HRNA	Human Development Recovery Needs Assessment
INGO	International Non-Government Organisation
IRP	International Recovery Platform
KB	Knowledge Base
NGO	Non-Government Organisation
OCHA	Office for the Coordination of Humanitarian Affairs (UN)
PDNA	Post-Crisis Damage and Needs Assessment
RRNA	Rapid Recovery Needs Assessment
RRP	Reconstruction and Recovery Planning
SOTA	State of the Art
UNDP	United Nations Development Programme
WP	Work Package

2 SCOPE

The purpose of this document is to provide a thorough overview of the current state of the art (SOTA) of needs assessments tools for reconstruction & recovery. This review is specifically focused on the functionality of the tools. Business models and market related activities are excluded from this undertaking.

This deliverable will be used, together with the deliverables from T2.1 (*User Requirements Gathering and Recognition*), as an input into the next design phases of DESTRIERO, in particular Work Package 4 (WP4) *(Functional interoperability for coordination and planning activities*).

The document describes the DESTRIERO task that was undertaken (T2.4) to achieve this deliverable as part of WP2 (*PDNA and RRP user requirements*).

The objectives and constraints of the undertaking are declared.

The list of tools and knowledge bases that were found during the undertaking are also listed.

A series of evaluation and benchmarking activities subsequently follows. These were applied to narrow down the possible tools that could be leveraged by DESTRIERO.

Finally, the report presents a summarization of our conclusions, declaring the major gap analysis in addition to the recommendations for future actions.

3 OBJECTIVES

3.1 Initial Objectives

At the outset the objectives for the SOTA task were taken from the high level objectives of WP2 itself. In short, it was expected that the task (i.e. T2.4) would:

- Identify state of art of “needs assessment tools” for reconstruction and recovery.
- Analyse current capabilities and state of art of reconstruction and recovery activities.
- Identify all existing gaps and needs with respect to recovery decision support.

Following a more in-depth inspection of the task to be executed the following was identified as necessities for the effective undertaking of the task T2.4:

- Research and analyses existing needs assessment tools for reconstruction and recovery.
- Analyse previous and current EU projects that may be relevant as well as and non-EU initiatives.
- Review existing “needs assessment” tools using assessment criteria for their suitability to partially fulfil the DESTRIERO user requirements (D2.1).
- Contact stakeholders to identify other proprietary tool that they may be using or be aware of.
- Define analysis criteria to correctly determine which tools are relevant to the DESTRIERO project.
- Look in detail at the data models and flows in and out of tools and their licensing constraints.
- Examine the capability of tools for possible readiness to integrate with DESTRIERO.
- Identify gaps in the overall field of needs assessment tools.

3.2 Partners

The DESTRIERO partners on the task contributed in the following areas:

Partner	Major Task
SAADIAN	• Task management • Co-ordination of tools identification • Evaluation methodology • Evaluation of tools • Reporting
EGEOS	• Identification of tools • Evaluation of tools

Partner	Major Task
ITTI	• Identification of tools • Evaluation of tools • Benchmarking methodology • Benchmarking of tools
TRT	• Identification of tools • Evaluation of tools

Table 1- DESTRIERO Partners

In addition other DESTRIERO partners not directly involved in the task contributed by way of tool suggestions. The partners AMPER and FHG acted as reviewers of the deliverable.

3.3 Approach

We adopted a methodical phased approach for the undertaking of Task 2.4. It consisted of the following phases:

Phase 1 – Compile long list of tools.
Phase 2 – Define evaluation criteria.
Phase 3 – Define short list of tools.
Phase 4 – Evaluate short list.
Phase 5 – Produce final report.

Work was primarily implemented in a chronological manner commencing at Phase 1 and concluding at Phase 5. As the undertaking evolved, the partners decided that multiple evaluation techniques were required due to the disparate nature of tools and knowledge bases that were discovered, and the difficulty of reducing them to a short list.

These evaluation techniques are described in more detail in Section 5 of this document.

3.4 Evolution of PDNA

Post-Crisis Damage and Needs Assessment (PDNA) was developed in 2005, led by United Nations Development Programme (UNDP), and evolved from the Damage and Loss Assessment (DALA) methodology laid down by the Economic Commission for Latin America and the Caribbean (ECLAC).

Its aim is to coordinate recovery efforts by all stakeholders who are engaged in post-disaster recovery operations, including national governments, the United Nations (UN) system, international financial institutions (IFIs), donors, international non-government organisations (INGOs), local NGOs and communities. It seeks to address coordination challenges caused by variations in methods employed by the stakeholders.

PDNA was initially thought of as a methodology to define guidelines and toolkits for needs assessment, marrying the economic driven approach of DALA with the humanitarian aspects of the United Nations Human Development Recovery Needs Assessment (HRNA) approach.

However as many organisations and nations continued to develop their own needs assessment tools, in some cases sector specific, the purpose of PDNA itself has needed to change.

PDNA is now described as an **approach** or a **framework** rather than a methodology in itself. It is concerned with guiding existing national, sectoral, or agency led needs assessment processes (where these exist), to deliver the long term recovery needs.

It also aspires to fill gaps in processes, guidelines and tools where none exist within countries or sectors.

The primary purpose of the PDNA framework is to provide all actors in the recovery process – including national and local authorities, international agencies and local communities – with a multi-sectoral, technical overview of the damage and loss patterns and the principal recovery needs and priorities to be addressed to help with reconstruction, development and risk reduction.

There is no "one size fits all" approach to PDNA. From a SOTA point of view this has meant taking a very open approach to consideration of tools or knowledge bases that could be relevant to PDNA. Also PDNA can never be limited or closed to a fixed set of requirements. [1]

3.5 Constraints

During the task several constraints that are listed in the next subsections were encountered.

3.5.1 Availability of User Requirements

In order to avoid unnecessary delay to the project duration, the SOTA task (T2.4) was performed in parallel with T2.1 (*User Requirements Gathering and Recognition*). Therefore, it was known in advance that it would not be possible to include a detailed set of user requirements for use in the evaluation of tools.

The task dealt with this constraint in two ways.

Firstly the four key architectural **Pillar** objectives of DESTRIERO were identified as key to the evaluation:

1. Data Collection
2. Presentation of Information
3. Decision Support

4. Interoperability

Secondly the topics included in the *DESTRIERO User Requirements Questionnaire* that was developed as part of T2.1 were used as a draft set of user requirements.

3.5.2 Contacts with End Users

The task partners were not able to gain direct access to as many end users as we would have preferred. This due to a number of factors:

- The limited timeframe for the task, and its scheduling at the start of the project, meant that the *DESTRIERO User Group* (T1.4) was not yet be fully established.
- The SOTA task (T2.4) was nearing completion when the first *DESTRIERO End User Workshop* took place as part of T2.1, so there was limited time to consider the Workshop outcome.
- Many end users were undoubtedly focused on important operational matters, e.g. the Philippines crisis, Sardinia floods, major storm damage in Scotland.
- Unavailability or lack of response from end users contacted.
- The late entrance of end user AMI into the DESTRIERO consortium.

To address this gap, the *DESTRIERO User Requirements Questionnaire* asked end users three specific questions about tools. These questions and a summary of the responses are included in Section 4.2 of this document.

3.5.3 Classification of Tools

As we started to gather and investigate tools, it became evidently clear that many of those discovered were not software tools, but rather documents, guidelines, reference material, web sites, algorithms, resources or knowledge bases that were often referred to as *tools* or *toolkits*.

This indicated immediately that there is a shortage of **software tools** addressing the requirements of PDNA, and that it would be difficult for SOTA to evaluate many contender tools for DESTRIERO.

The partners dealt with this in three ways:

1. Classification was simplified into two types:

    - **Tools** – Items that have some elements of computing capability or usage.
    - **Knowledge Bases** – Items with no computing capability but likely to be relevant to PDNA.

    This classification was key to how later evaluation and benchmarking worked.

2. The gathering of tools was widened to include generic tools that could possibly fulfil one of the DESTRIERO Pillars, e.g. decision support.

3. A focus was put on looking at combinations of tools and knowledge bases that could be useful for DESTRIERO.

3.6 Revised Objectives

In the light of the constraints encountered the partners decided to re-adjust the task objectives as follows:

- Rather than focusing purely on PDNA tools we decided to take a broader view to see how the PDNA approach or framework itself is supported in the market and user domain.

- This would be based on a review of dedicated and generic tools in combination with knowledge bases.

- It was decided that a multi-faceted approach to evaluation was required, in order to sift through the array of tools and knowledge bases found. These evaluation techniques are described in more detail in Section 5 of this document.

- Finally, to demonstrate the significant gap in PDNA tools that DESTRIERO seeks to address.

4 TOOLS & KNOWLEDGE BASES

The first phase of the task was to compile a long list of tools. This was implemented based on the combined research by all partners involved in the task, as well as contributions from across the consortium.

We looked for tools that fell into **one or more** of the following categories:

1. Currently support the PDNA framework in a full or partial way.
2. Other Needs Assessment tools used by NGO's or government agencies.
3. Tools developed as part of other FP6/7 projects.
4. Operational, Field, Mapping, Data Collection, Decision Support or Intelligence tools used by agencies in this area.
5. Knowledge bases of previous disasters or "snapshots" of pre-disaster situations.

Our goal was to identify tools that could **possibly be improved or even replaced by DESTRIERO**, or that could **possibly integrate and share information** with DESTRIERO on an ongoing basis.

4.1 Simple List of Tools and Knowledge Bases

The list of tools compiled is shown in Table 2 below with basic details. A more detailed list is shown in Appendix A.

No	Name	Organisation / Vendor / Owner	URL
1	GDACS	United Nations, the European Commission, Disaster Managers Worldwide	http://www.gdacs.org/
2	DESINVENTAR	Corporación OSSO - Colombia (in association with EU	http://online.desinventar.org
3	EU ECHO platform for Global Needs Assessments	EU ECHO	http://echo-global-vulnerability-and-crisis.jrc.ec.europa.eu/
4	EU ECHO Common Emergency Communication and Information System (CECIS)	EU ECHO	http://ec.europa.eu/echo/policies/disaster_response/cecis_en.htm
5	Ushahidi	Ushahidi	http://www.ushahidi.com/

No	Name	Organisation / Vendor / Owner	URL
6	GeoNetwork	FAO	http://www.fao.org/geonetwork/srv/en/main.home
7	Financial Tracking Service	UNOCHA	http://fts.unocha.org/
8	Humanitarian Open Street Map	HOT	http://hot.openstreetmap.org/
9	Google Map Maker	Google	http://maps.google.com
10	Humanitarian eXchange Language	UNOCHA.	http://hxl.humanitarianresponse.info/
11	Humanitarian Data Model	Open data	http://wiki.openstreetmap.org/wiki/Humanitarian_OSM_Tags/Humanitarian_Data_Model
12	Mapbox	Mapbox	www.mapbox.com
13	Copernicus	European Earth Observation Programme	http://ec.europa.eu/enterprise/policies/space/copernicus/index_en.htm (EC) http://gmes.cbk.waw.pl/index.php?option=com_content&view=article&id=1&Itemid=15&lang=en (Polish Academy of Sciences, Space Research Center)
14	SPEKTROP-L	National Center for Research and Development in Poland	http://gmes.cbk.waw.pl/multifraktale/kontakt.html
15	SCARF	Space Research Centre of Polish Academy of Science	zoz.cbk.waw.pl/index.php/en/projects/scarf
16	Geoland-2	FP7	http://www.gmes-geoland.info/
17	GeoNetCap	FP7	http://geonetcab.espace-dev.fr/index.php/presentation
18	G-Mosaic	FP7	http://www.gmes-gmosaic.eu/project-overview/19
19	PEARL	FP6	http://cordis.europa.eu/publication/rcn/10204_en.html
20	LIMES	FP6	http://en.wikipedia.org/wiki/LIMES_Project
21	ISOK		http://www.isok.gov.pl/en/about-the-project
22	Alice System	ASTRI and Space Research Center of Polish Academy of Sciences)	http://www.astripolska.pl/0,1,93.html
23	Virtual OSOCC	UNOCHA	http://vosocc.unocha.org/
24	ELITE	FP7	
25	GeoServer	OSGeo project	http://geoserver.org/display/GEOS/Welcome

No	Name	Organisation / Vendor / Owner	URL
26	SAHANA		
27	ESS	FP7	http://www.ess-project.eu/
28	INDIGO	FP7	http://indigo.diginext.fr/EN/index.html
29	MEDSI	FP6	http://www.introsolutions.com/medsiEN.html
30	1000Minds	1000Minds	http://www.1000minds.com/
31	D-Sight Desktop	D-Sight	http://www.d-sight.com/
32	DecisionTools Suite 6.0	Palisade	http://www.palisade.com/decisiontools_suite/
33	Enterprise Portfolio Simulator	ProModel	http://www.promodel.com/products/eps/
34	Expert Choice Comparison Suite	ExpertChoice	http://expertchoice.com/
35	KNITRO	Ziena Optimization LLC	http://www.ziena.com/knitro.htm
36	ACRIMAS	FP7	http://www.acrimas.eu/
37	OASIS	FP6	ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/sustainable-growth/fp6-fact-sheet-oasis_en.pdf
38	REACT	FP6	ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/sustainable-growth/fp6-fact-sheet-react_en.pdf
39	IRMA	FP7	ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/sustainable-growth/fp7-irma_en.pdf
40	Intergraph	Intergraph	http://www.intergraph.com/
41	NERIS-TP	FP7	http://www.eu-neris.net/
42	GIO EMS services	DG-ECHO/MIC DG JRC	http://emergency.copernicus.eu
43	G-NEXT	EC REA	http://externalaction.security-copernicus.eu/
44	G-SEXTANT	EC REA	http://externalaction.security-copernicus.eu/
45	CHARTER		http://www.disasterscharter.org/home
46	GDACS		http://www.gdacs.org/
47	RELIEFWEB		http://reliefweb.int/
48	UN-SPIDER		http://www.unoosa.org/oosa/en/unspider/index.html
49	Google Crisis Response		http://www.google.org/crisisresponse/
50	Cobacore	FP7 Project	http://cobacore.eu/index.html
51	Humanitarian Response	UN OCHA	www.humanitarianresponse.info http://www.parkdatabase.org/ https://assessments.humanitarianresponse.info/

No	Name	Organisation / Vendor / Owner	URL
52	Tsunami Recovery Impact Assessment and Monitoring System	WHO	http://www.who.int/hac/crises/international/asia_tsunami/triams/en/index.html
53	UNHCR Emergency IM toolkit	UNHCR	http://data.unhcr.org/imtoolkit/
54	Crisis Mappers	Crisis Mappers	http://crisismappers.net/
55	SDI4LEB	GFDRR	https://www.gfdrr.org/sites/gfdrr.org/files/publication/WRC_ProceedingsMedRes150.pdf
56	WHO Toolkits (HIA)	WHO	http://www.who.int/hia/tools/toolkit/en/
57	WHO Toolkits	WHO	http://www.who.int/ipcs/methods/harmonization/areas/ra_toolkit/en/
58	IASC/NATF	UN OCHA	http://www.humanitarianinfo.org/iasc/pageloader.aspx?page=content-subsidi-common-default&sb=75
59	GFDRR	GFDRR	
60	ACAPS	NGOs (HelpAge International, Merlin and Norwegian Refugee Council)	http://www.acaps.org/

Table 2 - Simple List of Tools & Knowledge Bases

4.2 User Requirements Questionnaire Responses

End users who completed the *DESTRIERO User Requirements Questionnaire* were asked three specific questions about tools in use:

1. Is there a **collaborative work system** within your organisation that keeps track of which capabilities/resources are currently available for PDNA/RRP?
2. Does your organisation use collaborative work **tools** for PDNA/RRP?
3. Could you please point out **gaps and/or limitations** (if any) related to used tools?

In total 18 participants expressed their views by the time of this report and a summary of their responses is shown in Table 3 below:

Organisation	Collaborative Work System	Tools	Gaps and/or limitations
MSB	*No response*	No	*No response*
AKNZ	Disaster relief desk keeps all the records	?	?

Organisation	Collaborative Work System	Tools	Gaps and/or limitations
112 Solution LT	VOSOCCC/EUCP Portal	No	Competency of operatives
GIES Romania	National Management System	Yes, Joint exercises, Contingency plans, preparation activities and meetings	Institutional capabilities can influence the efficiency of plans
Unsigned	*No response*	No	*No response*
Unsigned	EU Dbase	Yes	*No response*
Vienna Fire Dept.	*No response*	No	*No response*
Fire Safety and Civic Protection MoI	Responsibility of Gov & Prime Minster	No	*No response*
Belfast Resilience Forum	Each organisation would maintain their own list of resources although there is some work beginning for agencies to list their resources centrally.	Not specific tools – we prefer to keep things simple in the multi-agency environment so documents are all produced on Word. We also work with Spatial NI which is the NI mapping service. They can produce a GIS viewer to use in emergencies to map the affected areas and assist planning.	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.
French Academy for Fire, Rescue and Civil Protection Officers (ENSOSP)	*No response*	No	*No response*
THW	No	No	No
National Operations Centre, Netherlands	No	No	Generic approach based on secondary data.

Organisation	Collaborative Work System	Tools	Gaps and/or limitations
Belgian Federal Public Service Health	Not at this moment; there is a voluntary Exchange of experience between certain members, more informal and case based	No	*No response*
Lithuanian Fire and Rescue School	No	No	*No response*
Irish HSE InterAgency	Yes – A framework for major emergency management	No	*No response*
ICT4Peace Foundation	Reliefweb, Humanitarian Response/OCHA	Wikis, Digital Humanitarian Network	Interoperability, standards, governance around data, privacy, security
UNHCR	Yes/No?	*No response*	*No response*
US Department of Homeland Security	*No response*	Yes	*No response*

Table 3 – End User Questionnaire Responses

5 EVALUATION

The following section details the evaluation methodologies used in evaluating the tools and knowledge bases that could be employed, or form part of the needs assessment tools for reconstruction and recovery. There was a particular emphasis on ensuring that these tools and knowledge bases supported the four broad Pillar requirements namely Data Collection, Presentation of Information, Decision Making and Interoperability.

This evaluation was implemented in conjunction with each partner in order to gain a consensus of approach and subsequent outcome. The evaluation was completed in the absence of well-defined and granular user requirements and therefore the selection criteria used were quite generic.

5.1 Methodologies Used

In order to evaluate the tools and resources, the following methodologies were used:

- Qualitative Screening.
- Quantitative Evaluation.
- Benchmarking Procedure.

The partners initially performed a Qualitative Screening (i.e. evaluation) on the list of tools and knowledge bases. The result was a descriptive determination of the relevance of each tool and knowledge base. This allowed an immediate screening of those tools and knowledge bases that may be of benefit.

It was subsequently decided that a more Quantitative approach to the evaluation process was required using this filtered list, in order to provide input to a Benchmarking procedure.

The difference between the Qualitative and a Quantitative Evaluation is best described by Casley et al. [7] “The most obvious distinction between the two is that quantitative methods produce numerical data and qualitative methods result in information which can best be described in words”.

The Benchmarking procedure allowed a more rigorous scientific approach to determine the validity of each of the tools and knowledge bases, in relation to the overall requirements.

5.2 Qualitative Screening

A list of potential tools and knowledge bases was determined by investigating existing solutions and relevant documents that are currently being employed or used in this area, and based on feedback from various partners and practitioners. A screening was done as part of this investigation to immediately rule out tools and knowledge bases that were not relevant. Tools and knowledge bases that were deemed to be worth further consideration, were identified and flagged, along with those that would not be considered.

5.2.1 Selection Criteria

Selection criteria were drawn up to determine the viability of the tools and knowledge bases as part of a subsequent Qualitative Screening. Due to the absence of known requirements from the eventual end users, a generic set of selection criteria was employed based on general expectations for a tool or knowledge base.

The appropriate values for each evaluation criterion were determined.

The selection criteria and appropriate values used for evaluating the tools and knowledge bases are listed below in groupings:

Category	Description	Applicable Values
ID	Reference to tool/knowledge base	
Name	Name of tool/knowledge base	
Type	Type	Tool / Knowledge Base
Evaluated By	Partner who evaluated the tool/knowledge base	TRT/EGEOS/SAADIAN/ITTI
Short List	Whether to include in the short list	Y/N
Applicability Group		
Dedicated/Non Dedicated	D: Dedicated – single function tool ND: Non Dedicated – part of a suite of tools	D/ND
Specific or Generic	S: Specific - designed for needs assessment usage G: Generic - general business tool that could be applied to needs assessment	S/G
Fit for purpose as is	Y: Ready to Use N: Requires customisation	Y/N
Software Dependency	Software is required to use (e.g. mathematical or simulation engines required)	Y/N
Technical Fit Group		
Available	Y: Facility to query and retrieve information N: No APIs available	Y/N

Category	Description	Applicable Values
Type/Protocol	Protocols supported	HTTP,SOAP/REST/XMP-RPC/FTP/RSS Feed/Other
Input/Output Format	Data Format	XML/JSON/Flat File/Image/Other
Embedded Application	Y: Tool can be embedded N: Non embedded	Y/N
Development Platform	Y: A development platform N: Not used as a development platform	Y/N
Can Use External DBs	Possibility to use external databases as data sources	Y/N
Supports Custom Algorithms	May be used to implement custom algorithms and methodologies	Y/N
Cost & Licensing Group		
Cost	Cost of Tool or KB F: Free L: Low (less than €10K Per Annum) H: High (greater than €10K Per Annum) N/A: Unknown/TBD	F/L/H/N/A
Licensing	Licensing Constraints Y: License constraints on usage N: No License required N/A: Unknown/TBD	Y/N/N/A
Open Source	Whether Open Source tool	Y/N
Quality Group		
Currency of tool/content	Y: Always up to date N: Out of date	Y/N
Accuracy & Quality	Accuracy / Integrity of tool H: High M: Medium L: Low	H/M/L
Security & Privacy (of content)	H: Secure L: Unsecure N/A: Unknown/TBD	H/L/N/A
Reliability & Support	Whether service and support is available or not H: High L: Low	H/L
Usability Group		

Category	Description	Applicable Values
Endorsed/Recommended	Reputations H: Approved by major institution, e.g. Office for the Coordination of Humanitarian Affairs (OCHA) L: Not approved	H/L
Usability/Ease of Use	Ease of usage / integration H: High M: Medium L: Low	H/M/L
Documentation/Help	Y: Well Supported documentation N: Inadequate Documentation	Y/N
Objectives (DESTRIERO Applicability) group		
Data Collection	Does it support the Data Collection Pillar	Y/N
Presentation of Information (GIS)	Does it support the Presentation of Information Pillar	Y/N
Decision Making	Does it support the Decision Making Pillar	Y/N
Interoperability	Does it support the Interoperability Pillar	Y/N
Notes	General Notes	

Table 4 – Qualitative Screening Criteria

5.2.2 Partner Screening

Once the evaluation criteria were produced, the partners evaluated each of the tools and knowledge bases individually. This allowed the partners to quickly identify which of the tools and knowledge bases would be of real benefit.

The results of the Qualitative Screening for short listed tools and knowledge bases are listed by group in the following Appendices:
Appendix B – Applicability Criteria
Appendix C – Technical Fit Criteria
Appendix D – Cost & Licensing Criteria
Appendix E – Quality Criteria
Appendix F – Usability Criteria
Appendix G – Objectives Criteria

Given the subjectivity of the responses, it was determined that a more measured approach to the evaluation was needed. We then decided to introduce an additional quantitative approach to the overall evaluation process.

5.3 Quantitative Evaluation

The methodology used to perform the Quantitative Evaluation was based on the framework defined in the Quantitative Methods for Software Selection and Evaluation paper [6].

In order to do a Quantitative Evaluation, the evaluation criteria were consolidated into appropriate groupings.

The groups and categories within each group are listed below:

Category	Group
Dedicated/Non Dedicated	Applicability
Specific or Generic	
Fit for Purpose As Is?	
Data Collection	Objectives
Presentation of Information(GIS)	
Decision Making	
Interoperability	
Cost	Cost & Licensing
Licensing Constraints	
Open source	
Available	Technical Fit
Type/Protocol	
Output Format	
Embedded Application	
Development Platform	
Currency of Tool/Content	Quality
Accuracy & Quality	
Security & Privacy (of content)	
Reliability & Support	
Endorsed/Recommended	Usability
Usability/Ease of Use	
Documentation/Help	

Table 5 – Evaluation Groups

The results from Qualitative Screening process was used to help facilitate the scoring of each tool and knowledge base.

A Value and Score field was associated with each group. This allowed the tools and knowledge bases to be scored and ranked subsequently.

5.3.1 Scoring Option Values

The appropriate score system for the tools and knowledge bases is detailed below:

Score Value	Definition
1.0	Fully satisfies requirement or decision criterion
0.5	Partially satisfies requirement or decision criterion
0.0	Unknown or null/balanced. (Neither satisfies nor dissatisfies requirement or decision criterion)
-0.5	Partially dissatisfies requirement or decision criterion
-1.0	Fully dissatisfies requirement or decision criterion

Table 6 – Scoring Option Values

- The scoring system is based on a "higher is better" score, e.g. a score of 1.0 for a knowledge base in the Applicability group implies that the knowledge base is a dedicated and specific fit for DESTRIERO.
- It is recommended not to overly decompose the requirements (hence the groupings) for the weightings. The absence of defined and granular end user requirements merited this approach.
- Use of negative score values permits the application of a "penalty" value where not meeting the criterion would be detrimental

5.3.2 Group Scoring Guidelines

The scoring guidelines for each group are shown in the following table:

Category	Group	Example Best Score (1.0)	Example Worst Score (-1.0)
Dedicated/Non Dedicated	Applicability	Dedicated, specific and fit for purpose as is (doesn't require any dependency on additional software)	Non Dedicated, not specific and not fit for purpose. May require additional software to use
Specific or Generic			
Fit for Purpose As Is?			
Software Dependency			
Data Collection	Objectives	Is hugely applicable	Not applicable at all
Presentation of Information(GIS)		Is hugely applicable	Not applicable at all
Decision Making		Is hugely applicable	Not applicable at all
Interoperability		Is hugely applicable	Not applicable at all
Cost	Cost & Licensing	Cost is low or free, that it has no licensing constraints (or is GPL/LPL) or open source (Whether Open source or not may not be a huge factor if costs are low for a commercial product).	Worst would be that it is a huge cost and has large licensing constraints.
Licensing Constraints			
Open source			

Category	Group	Example Best Score (1.0)	Example Worst Score (-1.0)
Available Type/Protocol Input / Output Format Embedded Application Development Platform Can use External Databases Support Custom Algorithms	Technical Fit	API available , standard protocols for communication (e.g. HTTP/SOAP/XML/RPC). Standard relevant data inputs/outputs (XML/JSON/KML etc.), can link to external databases and can be used to support custom algorithms or methodologies. Alternatively could be easily embedded as part of a tool, or used as a development platform quite easily.	No API available, cannot be used in conjunction with an external database, doesn't support custom algorithms or methodologies, cannot be used as a development platform or couldn't be easily embedded into an application.
Currency of Tool/Content Accuracy & Quality Security & Privacy (of content) Reliability & Support	Quality	Tool / Resource always up to date, with a high degree of accuracy and quality; the data is quite secure and the tool/resource is very reliable.	Tool / Resource is not up to date, low degree of accuracy and quality, the data is not secure and the tool/resource is unreliable.
Endorsed/Recommended Usability/Ease of Use Documentation/Help	Usability	Tool / Resource is endorsed / recommended highly, with a fairly high ease of use and has adequate documentation and help.	Tool / Resource has not been endorsed, hard to use and doesn't have much documentation or help to use.

Table 7 – Group Scoring Guidelines

5.3.3 Criteria Weighting

In order to evaluate the groups and criteria effectively, it was deemed necessary to introduce a weighting on scores for each group.

The relative weights for each group were determined as follows:

- The Objectives (i.e. four DESTRIERO Pillar requirements) were deemed to have of equal and significant weighting relative to all the other criteria. It was determined that these Pillar requirements should be given this importance due to the absence of the final user requirements.
- The Technical Fit criteria was deemed to have of equal weight as each of the objectives, given the importance of interoperability as part of the overall deliverable.
- The Quality criteria was deemed to be of more significant value than the remaining groups, given the importance of what the tools would be eventually employed for.

- The weightings for each group in evaluating the knowledge bases varied from the weighting for the tools. Weightings (and scores) for Cost & Licensing and Technical Fit were not necessary for knowledge bases. The weighting for Applicability was deemed to have significant importance for a knowledge base. All the remaining groups have the same weighting for both tools and knowledge bases.

Table 8 details the various weightings that were applied to each of the groups:

Category	Group	Weighting for Tools	Weighting for KB
Dedicated/Non Dedicated	Applicability	5	25
Specific or Generic			
Fit for Purpose As Is?			
Data Collection	Objectives	15	15
Presentation of Information(GIS)		15	15
Decision Making		15	15
Interoperability		15	15
Cost	Cost & Licensing	5	None
Licensing Constraints			
Open source			
Available	Technical Fit	15	None
Type/Protocol			
Output Format			
Embedded Application			
Development Platform			
Currency of Tool/Content	Quality	10	10
Accuracy & Quality			
Security & Privacy (of content)			
Reliability & Support			
Endorsed/Recommended	Usability	5	5
Usability/Ease of Use			
Documentation/Help			
Total		100	100

Table 8 –Criteria Weighting

5.3.4 Partner Scoring

The long list of tools and knowledge bases were evaluated by each partner as follows.

1. The list was divided into sub lists for Quantitative Evaluation by a given partner.
2. Tools and knowledge bases that were identified during the Qualitative Screening as irrelevant were ignored.

3. Each partner scored each of the corresponding tools and knowledge bases in their sub list.
4. Overall totals for each tool and knowledge base were determined.
5. Rankings on the overall totals were determined, along with ranking by the DESTRIERO Pillar Totals, and finally ranking by each individual DESTRIERO Pillar.

5.3.5 Partner Scoring Variances

It was considered that each partner may score all of the tools and knowledge bases, and variances determined and consolidated. It was decided though that the scores may be generally consistent across each partner. This approach may be considered however at a future stage in the project for a smaller list of tools and knowledge bases.

5.3.6 Ranking of Tools and Knowledge Base

After the Quantitative scoring the following results were obtained.

Table 9 details the top ten scores overall:

Type	Tool/Resource	Overall Score
Tool	GIO EMS services	100
Tool	CHARTER	92.5
Tool	GeoServer	87.5
Tool	Intergraph	87.5
Knowledge Base	Humanitarian Response	85
Tool	GDACS	82.5
Tool	GeoNetwork	80
Tool	Humanitarian Open Street Map	80
Tool	Alice System	80
Tool	Virtual OSOCC	77.5

Table 9 – Ranking by Overall Score

Table 10 details the top five scores based on the four DESTRIERO Pillar objectives:

Type	Name	All Pillars Score
Tool	Alice System	60
Tool	REACT	60
Tool	GeoServer	60
Tool	Intergraph	60
Tool	GIO EMS Services	60

Table 10 – Ranking By Pillars Score

A full list of rankings from Quantitative Evaluation is shown in Appendix H.

5.4 Benchmark Procedure

The purpose of the Benchmarking procedure was to provide an evaluation and scoring mechanism based on a comparison of the various software tools and knowledge bases.

Initially, a more formal approach to the Benchmarking procedure was envisaged. However, due to the lack of applicable mathematical algorithms and knowledge databases that could be employed, it was decided that a qualitative approach to the existing evaluation criteria would be done.

The procedure was applied to the list of tools and knowledge bases identified in the Quantitative Evaluation and to help provide a recommendation for the software tools to be used in the DESTRIERO project.

Knowledge databases were not benchmarked as part of this procedure. An appropriate set of knowledge databases will be chosen later in the project, when the detailed requirements are known.

5.4.1 Methodology

In order to evaluate state of the art tools and knowledge bases to be used in the DESTRIERO project, it was decided that the following requirements should be taken into account.

- **Critical Requirements**
  These are requirements that must be completely fulfilled, in order to make the tool appropriate for the project. If any of these requirements are not completely fulfilled, then the tool is immediately removed from the list for consideration. Usually such requirements are binary in nature (i.e. “yes” or “no”) which simplifies their assessment process.

- **Serious Requirements**
  There are requirements that must be fulfilled to some degree, in order to make the tool appropriate for the project. If any of these requirements are not fulfilled, then the tool is immediately removed from the consideration list.

- **Wish-list requirements**
  These are requirements that bring additional value to the tool if fulfilled. However if these requirements are not fulfilled, they are not removed from the eventual list.

The list of tools that was identified as part of the Qualitative and Quantitative Evaluation phases was used as input to the Benchmarking procedure.

5.4.2 Benchmarking Steps

Stage 1 – Critical IT requirements

The first stage of the Benchmarking procedure is to evaluate the critical IT requirements of the tools, and to quickly eliminate tools that cannot be used due to technical limitations. The following are the critical IT requirements

1. **Usage out of the box**
   DESTRIERO is not a software integration project. Consequently the extensive customization of existing software or the creation of bespoke software using general purpose frameworks is considered outside the scope of the project.
2. **No external software dependency**
   Similarly, building an entirely new IT system from components is outside the scope of the project.

All tools that do not fulfil any of the above requirements were removed from the list. Table 11 lists software tools after Stage 1:

Name
GDACS
DESINVENTAR
EU ECHO Common Emergency Communication and Information System (CECIS)
Ushahidi
GeoNetwork
Humanitarian Open Street Map
Alice System
GeoServer
SAHANA
1000Minds
D-Sight Desktop
DecisionTools Suite 6.0
Enterprise Portfolio Simulator
Expert Choice Comparison Suite
KNITRO
Intergraph
GIO EMS services
CHARTER
RELIEFWEB
UN-SPIDER
Google Crisis Response

Table 11 –Stage 1 Software Tools

Stage 2 – Critical Integration requirements

The second stage of the Benchmarking procedure involved the evaluation of the integration capabilities of the selected tools. This is to ensure that they can cooperate with each other.

The critical integration requirements are as follows:

1. **Networking capability**
   The DESTRIERO tool is intended to be used to support recovery and reconstruction in the field, and thus must be accessible from various distributed locations and deployed mobile devices. Therefore, the selected software tools must be capable of communication with each other using any standard network data-exchange protocol (e.g. HTTP, RPC, Web Services, etc.)

2. **External database connectivity**
   Some external knowledge databases are intended to be used within the system. Therefore any tool that cannot communicate with an external database cannot be used in the DESTRIERO system.

All tools that do not fulfil any of the above requirements were removed from the list. The resulting list of software tools after Stage 2 is listed below:

Name
GeoNetwork
SAHANA

Table 12 –Stage 2 Software Tools

Stage 3 – DESTRIERO applicability (Serious Requirements)

The third stage of the Benchmarking is to evaluate how consistent the tools are with the DESTRIERO objectives. This is to ensure that the tools are appropriate for the project.

Consequently the following requirements must be fulfilled at least to some degree:

1. **Data collection**
   The software tool must support data collection in the field, especially using mobile devices.
2. **GIS presentation**
   The software tool must support the presentation of information using a GIS system.
3. **Decision making**
   The software tool must support decision making processes and procedures.
4. **Interoperability**
   The software tool must be able to work in a heterogenic IT environment and to co-operate with other systems and tools.

All tools that do not fulfil at least one of the requirements are removed from the list.
The resulting list consisted of the tools shown in Table 13:

Name
GeoNetwork

Table 13 –Stage 3 Software Tools

Stage 4 – Additional requirements

As the only one software tool fulfilled all of the critical and serious requirements of the DESTRIERO project, further evaluation of wish-list requirements was not considered at this stage of evaluation. However for the purpose of completeness, the soft requirements that were researched are listed below:

1. **Licensing**
   Free and open source tools are preferred over commercial ones.
2. **Reliability and quality**
   Tools that have a longer history of development and successful usage are preferred.
3. **Security and privacy**
   Additional security features gives an increased score for the tool.
4. **Recommendation**
   Recommendation by a well-known organisation that's involved in the process of reconstruction and recovery, gives an increased score for the tool.
5. **Ease of use**
   Tools that are easier to use are preferred.
6. **Documentation**
   Tools that have clear and well supported documentation are preferred.

6 CONCLUSIONS

Based on the detailed research and the adopted methodical approach for the execution of task T2.4, the following presents our conclusions and issued recommendations for next steps and implementation.

The underlying finding of our research is that the market at present does not sufficiently address or support the PDNA framework. Although the *DESTRIERO User Requirements Questionnaire* was limited in terms of coverage, it too supports this finding.

However, based on the research, the outcome of the Quantitative Evaluation indicated that a number of tools exist, that merit consideration for the evolution of the DESTRIERO toolset, as tools or as data sources. Taking the four main Pillar objectives of DESTRIERO, namely *Data Collection, Presentation of Information, Decision Support and Interoperability,* the top 10 tools that best fulfil the objectives are as follows: *GIO EMS Services, Charter, GeoServer, Intergraph, Humanitarian Response, GDACS, GeoNetwork, Alice System, Humanitarian Open Street Map and Virtual OSOCC.*

It is worth noting that using an alternative Benchmarking method, the tool *GeoNetwork* was the sole tool that fulfilled all of the critical and serious requirements of the DESTRIERO project. This tool also gained high scores in almost all of the additional soft requirements. It also ranked quite high in the Quantitative Evaluation (ranked in the top ten overall scores).

Our research revealed a number of gaps in the marketplace and the following table presents the Gap Analysis based on the four Pillar objectives:

Future State	Current Situation	Next Actions/Proposals
Harmonized Data Collection and Multiple Surveillance techniques within an integrated PDNA information management system available to all actors	This is the most strongly supported Pillar objective, among the tools which were evaluated	DESTRIERO to further investigate the tools identified in the market for use and integration within the broad DESTRIERO platform
Presentation of Information within GIS based user interface dedicated to PDNA and RRP	The is a quite well supported Pillar objective, among the tools which were evaluated	DESTRIERO to further investigate the tools identified in the market for use and integration within the broad DESTRIERO platform
Facilitating joint Decision Making for PDNA and RRP actors	This is a quite strongly supported Pillar objective, among the tools which were evaluated	DESTRIERO to further investigate the tools identified in the market for use and integration within the broad DESTRIERO

Future State	Current Situation	Next Actions/Proposals
		platform
Interoperability for large scale data collection	This is the least well supported Pillar objective, among the tools which were evaluated	DESTRIERO to develop as a platform to support Interoperability for existing tools used in the reconstruction and recovery phase

Table 14 –Gap Analysis

Our conclusion confirms that there is a definite need for a PDNA specific software toolset in line with the objectives of the DESTRIERO project. DESTRIERO should provide a platform for interoperability that will complement existing tools in the market. The findings of this report should provide input into WP4, WP5 & WP6 where the identified top 10 tools (listed above) should be revisited, with the final version of the DESTRIERO user requirement deliverable (D2.1), and any advancement that may have occurred to these tools during the interim period.

APPENDIX A:
DETAILED LIST OF TOOLS & KNOWLEDGE BASES

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
1	GDACS	Tool	Global Disaster Alert and Coordination System	United Nations, the European Commission, Disaster Managers Worldwide	http://www.gdacs.org/	Knowledge bases of previous disasters or "snapshots" of pre-disaster situations	GDACS is a collaboration platform for organisations providing information on humanitarian disasters. From a technical point of view, GDACS links information of all participating organisations using a variety of systems to have a harmonized list of data sources. In 2011, the GDACS platform was completely revised to collect, store and distribute resources explicitly by events. The system matches information from all organisations (by translating unique identifiers), and make these resources available for GDACS users and developers in the form of GDACS Platform Services. The GDACS RSS feed automatically include a list of available resources. The services include: • Information and data resources by event: http://www.gdacs.org/resources.aspx • Look-up service of identifiers [in development] • GDACS Platform API (available on request for posting to GDACS) http://gdacs.org/getid.aspx to find, convert or translate identifiers (currently not documented) http://gdacs.org/getresource.aspx to find resources by resourceid for particular events (currently not further documented). KML/RSS Feeds

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
2	DESINVENTAR	Tool	Inventory of disasters. Web based query tool	Corporación OSSO - Colombia (in association with EU	http://online.desinventar.org	Knowledge bases of previous disasters or "snapshots" of pre-disaster situations	
3	EU ECHO platform for Global Needs Assessments	Tool	This web application is an prototype tool for DG ECHO and the EU Member States. The purpose is to provide access, in an interactive way, to the composite indicators, as well as their source data, that are used in ECHO's humanitarian needs strategy.	EU ECHO	http://echo-global-vulnerability-and-crisis.jrc.ec.europa.eu/	Knowledge bases of previous disasters or "snapshots" of pre-disaster situations	• Assessment is based on global indicators • Tools to determine impartially and independently where the Commission's aid is most likely to be necessary. They also facilitate ensuring parity and consistency in the allocation of resources across continents and countries • Methodology paper here: http://ec.europa.eu/echo/files/policies/strategy/methodology_2011_2012.pdf
4	EU ECHO Common Emergency Communication and Information System (CECIS)	Tool	Facilitates communication between the MIC with National Authorities, making response to disasters faster and more effective. Its main task is to host a database on potentially available assets for assistance, to handle requests for assistance on the basis of these data, to exchange information and to document all action and message traffic. The end-users of CECIS are the MIC and National Contact points	EU ECHO	http://ec.europa.eu/echo/policies/disaster_response/cecis_en.htm	Knowledge bases of previous disasters or "snapshots" of pre-disaster situations	• Hosts a database on potentially available assets for assistance, to handle requests for assistance on the basis of these data, to exchange information and to document all action and message traffic • Mainly thought for prevention, preparedness and response • Might be useful to look at regarding design and exchange formats • End Users - MIC (Monitoring and Information Centre), National Contact Points

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
5	Ushahidi	Tool	Free and open source software for information collection, visualization and interactive mapping.	Ushahidi	http://www.ushahidi.com/		Open source software for information collection, visualization and interactive mapping.
6	GeoNetwork	Tool	GeoNetwork's purpose is: To improve access to and integrated use of spatial data and information • To support decision making • To promote multidisciplinary approaches to sustainable development • To enhance understanding of the benefits of geographic information	FAO	http://www.fao.org/geonetwork/srv/en/main.home		GeoNetwork's purpose is: • To improve access to and integrated use of spatial data and information • To support decision making • To promote multidisciplinary approaches to sustainable development • To enhance understanding of the benefits of geographic info
7	Financial Tracking Service	Tool	The FTS is a global, real-time database which records all reported international humanitarian aid(including that for NGOs and the Red Cross / Red Crescent Movement, bilateral aid, in-kind aid, and private donations).	UNOCHA	http://fts.unocha.org/		Potential out of score

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
8	Humanitarian Open Street Map	Tool	OpenStreetMap is a project to create a free and open map of the entire world, built entirely by volunteers surveying with GPS, digitizing aerial imagery, and collecting and liberating existing public sources of geographic data. The information in OpenStreetMap can fill in the gaps in base map data to assist in responses to disasters and crisis.	HOT	http://hot.openstreetmap.org/		• The Humanitarian OpenStreetMap Team (HOT) produces data for humanitarian response and economic development purposes. The group started as an informal collaboration between interested individuals and evolved into an incorporated organisation in August 2010 that is now active in over a dozen countries. • Ongoing projects undertaken by the community include mapping for disaster risk reduction, emergency mapping following a disaster, and custom software development to support the needs of the humanitarian community. • Field mapping in remote areas • Developer oriented • Have open tools for data access (http://export.hotosm.org/)
9	Google Map Maker	Tool	Mapping software	Google	http://maps.google.com		.• Google Map Maker helps relief organisations and affected communities create composite maps through the integration in Google Maps and Google Earth. • Google Map Maker was used to produce base maps of affected areas in Myanmar following Cyclone Nargis in 2008; in Vietnam after the country was hit by heavy flooding in 2009; and in Pakistan after a series of landslides in January 2010. In the Myanmar case, 40 volunteers at Google mapped 100,000 km of roads and 3,000 points of interest in just four days.
10	Humanitarian eXchange Language	Tool	Operational data sharing exchange language in humanitarian emergencies.	UNOCHA.	http://hxl.humanitarianresponse.info/		The durable solution for operational data sharing in humanitarian emergencies.

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
11	Humanitarian Data Model	Tool		Open data	http://wiki.openstreetmap.org/wiki/Humanitarian_OSM_Tags/Humanitarian_Data_Model		For digital exchange of geospatial information
12	Mapbox	Tool	Mapping software	Mapbox	www.mapbox.com		• Creating online maps • Possible Push and Pull
13	Copernicus	Tool	European Earth Observation Programme (AKA GMES) Copernicus consists of a complex set of systems which collect data from multiple sources: earth observation satellites and in situ sensors such as ground stations, airborne and sea-borne sensors. It processes these data and provides users with reliable and up-to-date information through a set of services related to environmental and security issues.	European Earth Observation Programme	http://ec.europa.eu/enterprise/policies/space/copernicus/index_en.htm (EC) http://gmes.cbk.waw.pl/index.php?option=com_content&view=article&id=1&Itemid=15&lang=en (Polish		NB - DOW - B1.2.3 Related R&D initiatives -"GMES maps will be the basis for GIS based DESTRIERO interface."

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
					Academy of Sciences, Space Research Center)		
14	SPEKTROP-L	Tool	They developed and tested some modules designed for spectral analyses to be installed on the airplanes, etc. They also do a lot of multifractal analyses of satellite images	National Center for Research and Development in Poland	http://gmes.cbk.waw.pl/multifraktale/kontakt.html		

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
15	SCARF	Tool	The SCARF (Satellite Cloud Climatology over Poland with Atmospheric Radiation Fluxes Estimation) project aims to estimate the fraction cloud cover over Poland with the most advanced satellite-based observations (data collected by MODIS, VIIRS, CPR-CloudSat, CALIOP-Calipso sensors). The goal of the project is to develop cloud cover climatology and then to answer the fundamental questions of what is the cloudiness of Poland, how it changes with space and time, how it is affected by the orography. Moreover, the GIS-ready and GIS-friendly, high spatial resolution (1 km/pixel) maps of cloud cover will be delivered to the scientific community (the very first data of this kind in Poland). The project is founded by the National Science Center of Poland	Space Research Centre of Polish Academi of Science	zoz.cbk.waw.pl/index.php/en/projects/scarf		
16	Geoland-2	Tool	Operational Monitoring Services for our Changing Environment. Benefiting from Earth Observation satellite data, the GMES Land Monitoring Core Service provides accurate and cross-border harmonised geo-information at global to local scales. Application examples are shown in the Core Information Services	FP7	http://www.gmes-geoland.info/	Tools developed as part of other FP6/7 projects	
17	GeoNetCap	Knowledge Base	The network promotes applications of earth observation, because we believe that earth observation provides added value in solving a problems of today's society. To do this, a number of organisations from all over the world are cooperating in the GEONetCab network	FP7	http://geonetcab.espace-dev.fr/index.php/presentation	Tools developed as part of other FP6/7 projects	

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
18	G-Mosaic	Tool	The G-MOSAIC (GMES services for Management of Operations, Situation Awareness and Intelligence for regional Crises) Collaborative Project will provide the European Union with intelligence data that can be applied to early warning and crisis prevention as well as to crisis management and rapid interventions in hot spots around the world. It aims at identifying and developing products, methodologies and pilot services for the provision of geo-spatial information in support to EU external relations policies and at contributing to define and demonstrate the sustainability of GMES global security services	FP7	http://www.gmes-gmosaic.eu/project-overview/19	Tools developed as part of other FP6/7 projects	
19	PEARL	Tool	PEARL (Port Environmental Information Collector) - EC project for in situ analyses of port environment, basing on satellite imaging	FP6	http://cordis.europa.eu/publication/rcn/10204_en.html	Tools developed as part of other FP6/7 projects	

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
20	LIMES	Tool	LIMES (Land and Sea Monitoring for Environment and Security) is an Integrated Project that provides to the GMES Program expertise in the security area through the development of applications and services applying innovative solutions based on Earth Observation systems and satellite Communication and Positioning technologies in the following domains: • Maritime Surveillance: monitoring of both vessel and cargo movements for reasons of maritime safety, policing and border security both over coastal and open ocean areas and Non-EU waters. • Land and Infrastructure Security: include Land Border Monitoring, Critical Infrastructure Surveillance, support to Event Planning and to Non Proliferation Treaty (NPT) monitoring. • Humanitarian Relief and Reconstruction: improvement and extension of the existing services that cover the whole crisis cycle: Disaster Preparedness, Operational Support & Reconstruction.	FP6	http://en.wikipedia.org/wiki/LIMES_Project	Tools developed as part of other FP6/7 projects	
21	ISOK	Tool	Under the Project an initial assessment of flood risk and maps of flood threats and maps of flood risks will be developed. Implementation of ISOK system shall place Poland among the countries which manage safety of their own society and economy in a modern manner and efficiently minimise a risk resulting from occurrence of catastrophic natural phenomena.		http://www.isok.gov.pl/en/about-the-project		

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
22	Alice System	Tool	System ALICE allows for rapid exchange of information between the various rescue units in the field and between field units and headquarter. ALICE provides a variety of information (GIS data, aerial and satellite images, units localisation meteorological data, etc.) directly to the user in the field. ALICE was created with the strong support of Polish firemen and was designed according to the philosophy, that to share operational picture and to support decision shared geographic environment is crucial. System ALICE allows: • Overlay all types of geographical data • Exchange information with the field units • Track vehicles and show their localisation to all other units • Perform analysis on different levels • Feed the system in real time with pictures, video, satellite images, GIS layers • Usage also by simple WWW interface on Smartphone/laptop • Share over internet with external decision makers and beneficent • Record history	ASTRI and Space Research Center of Polish Academy of Sciences)	http://www.astripolska.pl/0,1,93.html		

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
23	Virtual OSOCC	Tool	Has 160 000+ users that provide the service with good quality information (moderated by some UN officers). Information exchange and coordination of bilateral assistance in the early phase after major disasters.	UNOCHA	http://vosocc.unocha.org/		http://vosocc.unocha.org/Documents/20132_GDACS%20XML%20standard.pdf
24	ELITE	Knowledge Base	Experience sharing platform based on Community of Practice - the social network of experts connected with crisis management and relief activities	FP7		Tools developed as part of other FP6/7 projects	
25	GeoServer	Tool	GeoServer is an open source software server written in Java that allows users to share and edit geospatial data. Designed for interoperability, it publishes data from any major spatial data source using open standards.	OSGeo project	http://geoserver.org/display/GEOS/Welcome		
26	SAHANA	Tool	Software dedicated to the mission for saving lives, to better prepare and respond to disaster			Tools developed as part of other FP6/7 projects	
27	ESS	Tool	Emergency Support System, FP7, 2009-2013	FP7	http://www.ess-project.eu/	Tools developed as part of other FP6/7 projects	The Emergency Support System (ESS) is a suite of real-time data-centric technologies which will provide actionable information to crisis managers during abnormal events. This information will enable improved control and management, resulting in real-time synchronization between forces on the ground (police, rescue, firefighters) and out-of-theatre command and control centres (C&C).
28	INDIGO	Tool	Innovative Training & Decision Support for Emergency operations, FP7, 2010-2013	FP7	http://indigo.diginext.fr/EN/in	Tools developed as part of other FP6/7 projects	

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
					dex.html		
29	MEDSI	Tool	Integration of GIS with DB, decision support management tools and an auditory system to support on decisions in a crisis, FP6, 2004-2005	FP6	http://www.introsolutions.com/medsiEN.html	Tools developed as part of other FP6/7 projects	The overall aim of the MEDSI Project is development of a framework which will provide an integrated set of services to crisis managers and planners, especially to protect the critical infrastructures, territories against classical threats such as flooding or other natural disasters as well as terrorist attacks. MEDSI will enable utilization of various information sources for better monitoring and reduction risks, both potential and actual, and for more effective response to crises. MEDSI will also be capable to create, maintain and optimise the typical crisis scenarios simulating the real-world crises
30	1000Minds	Tool	1000Minds is for decision-making, prioritisation and discovering stakeholders' preferences via conjoint analysis.	1000Minds	http://www.1000minds.com/		
31	D-Sight Desktop	Tool	D-Sight Desktop is a software solution dedicated to supporting your decision-making processes. It provides a framework allowing you to evaluate alternatives on several criteria according to your preferences, and identify the best solution	D-Sight	http://www.d-sight.com/		

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
32	DecisionTools Suite 6.0	Tool	The DecisionTools Suite is an integrated set of programs for risk analysis and decision making under uncertainty that runs in Microsoft Excel. The DecisionTools Suite includes @RISK for Monte Carlo simulation, PrecisionTree for decision trees, and TopRank for "what if" sensitivity analysis. In addition, the DecisionTools Suite comes with StatTools for statistical analysis and forecasting, NeuralTools for predictive neural networks, and Evolver and RISKOptimizer for optimization. All programs work together better than ever before, and all integrate completely with Microsoft Excel for ease of use and maximum flexibility.	Palisade	http://www.palisade.com/decisiontools_suite/		

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
33	Enterprise Portfolio Simulator	Tool	Enterprise Portfolio Simulator provides the flexibility to merge data from Microsoft Project Server into EPS, allowing you to analyse your project data in a more dynamic way. Decision makers across the enterprise involved in planning and managing projects, resources, technology, and investments can now make better decisions, faster. Enterprise Portfolio Simulator allows you to make more effective decisions, generate real-life scenarios, and analyse such factors as: • Strategic Value • Net Present Value • Portfolio Productivity • Resource Constraints • Probability of Success	ProModel	http://www.promodel.com/products/eps/		

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
34	Expert Choice Comparison Suite	Tool	Collaboration Software for Organisational Decision-Making Comparion™ Core is a collaborative web-based application that enables teams to achieve alignment, buy-in, and confidence around important decisions. With Comparion™ Core, you can combine the expertise and intuition of your team with quantitative information to provide valuable insights, explore what-if scenarios, and reach stakeholder consensus and understanding. - See more at: http://expertchoice.com/products-services/comparion-suite/#sthash.gBkUIRxM.dpuf	ExpertChoice	http://expertchoice.com/		

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
35	KNITRO	Tool	KNITRO is a solver for nonlinear optimization. It is the most powerful and versatile solver on the market, providing three state-of-the-art algorithms. The broad range of behaviours exhibited by nonlinear problems makes this an essential feature. KNITRO is designed for large problems with dimensions running into the hundred thousands. It is effective for solving linear, quadratic, and nonlinear smooth optimization problems, both convex and nonconvex. It is also effective for nonlinear regression, problems with complementarity constraints (MPCCs or MPECs), and mixed-integer programming (MIPs), particular convex mixed integer, nonlinear problems (MINLP). KNITRO is highly regarded for its robustness and efficiency.	Ziena Optimization LLC	http://www.ziena.com/knitro.htm		
36	ACRIMAS	Tool	Large-scale incidents (man-made and natural) inside and outside the EU require a coordinated response from crisis managers and first responders across Europe and with resources from all levels of government. ACRIMAS will prepare a roadmap setting out the main areas and relevant topics of CM to be addressed by the Phase II. In addition, ACRIMAS will deliver a demonstration concept for Phase II, describing how and where the DE activities in Phase II should be conducted.	FP7	http://www.acrimas.eu/	Tools developed as part of other FP6/7 projects	

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
37	OASIS	Tool	Open Advanced System for Disaster and Emergency Management	FP6	ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/sustainable-growth/fp6-fact-sheet-oasis_en.pdf	Tools developed as part of other FP6/7 projects	
38	REACT	Tool	Reaction to Emergency Alerts using Voice and Clustering Technologies	FP6	ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/sustainable-growth/fp6-fact-sheet-react_en.pdf	Tools developed as part of other FP6/7 projects	REACT aims at reducing risks to citizens and the environment by enhancing the interactivity of citizens with Emergency Services and by providing added value to integrated information coming from disparate sources. REACT will: - capture more of the information available from callers and automatic systems; - complement the data with associated services able to semantically analyse and cluster environmental and crisis management information; - make data available to PSAP operators through a GIS-based interface; - allow the definition of operative scenarios to be used for an early identification of events and associated evolution patterns.

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
39	IRMA	Tool	Disaster risk reduction policies and institutional mechanism exist at various degrees of completeness in the African countries part of the consortium. Their effectiveness is however limited when having to deal with major disasters and complex emergencies. Risk management is often limited to specific hazard monitoring with limited or no consideration of the vulnerability of the area at risk neither to the systemic nature and possible domino effect between risks of different nature. It is the vulnerability of the population and of the infrastructure at risk that may transform a hazard into a major disaster. The purpose of the project is to build a reference platform suitable for the management of natural and environmental risks in Africa. The platform must allow the stakeholders in risks management to develop and use tailored risk management models; therefore, the platform will provide similar facilities as WIN, ORCHESTRA, SSE, SANY and u-2010 solutions	FP7	ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/sustainable-growth/fp7-irma_en.pdf	Tools developed as part of other FP6/7 projects	

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
40	Intergraph	Tool	GIS tools	Intergraph	http://www.intergraph.com/		Intergraph® is a leading global provider of engineering and geospatial software that enables customers to visualize complex data. Businesses and governments in more than 60 countries rely on Intergraph's industry-specific software to organise vast amounts of data and infuse the world with intelligence to make processes and infrastructures better, safer, and smarter. The company's software and services empower customers to build and operate more efficient plants and ships, create intelligent maps, and protect critical infrastructure and millions of people around the world.
41	NERIS-TP	Tool	Wide spread use of the new tools developed and integrated to the Decision Support Systems, such as RODOS and ARGOS. New product integration within the JRODOS Decision Support System (DSS). Tool for automated assessment of doses and potential consequences initiated by a message from the Unified System for Information Exchange in Incidents and Emergencies (USIE). Tools for operation of the Weather Research and Forecasting (WRF) modelling system, ICRP 103 screening tool, ERMIN, AgriCP and scenario preparation tool.	FP7	http://www.eu-neris.net/	Tools developed as part of other FP6/7 projects	

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
42	GIO EMS services	Tool	The GIO Emergency Management Service (GIO EMS) is the first Copernicus service to become operational (operations started on April 1st, 2012) and consists of a set of services (RUSH and NON RUSH) funded by the European Commission. It addresses, with a worldwide coverage, a wide range of emergency situations resulting from natural or man-made providing geospatial information Maps.	DG-ECHO/MIC DG JRC	http://emergency.copernicus.eu	Tools developed as part of other FP7 project	
43	G-NEXT	Tool	G-NEXT aims to contribute to the transition of the Copernicus services for Security applications from pre-operational to operational mode. In particular, G-NEXT will supply information and intelligence data in support of the European External Action Service (EEAS), including mapping and geo-information products ready for deployment in emergency and crisis situations, and will provide a set of services suitable to be integrated in the users working environment in an effective and reliable way	EC REA	http://externalaction.security-copernicus.eu/	Tools developed as part of other FP7 project	
44	G-SEXTANT	Tool	G-SEXTANT aims to develop a portfolio of Earth Observation (EO) products and services to support the geo-spatial information needs of EU External Action users and stakeholders, such as the European External Action Service and other users.	EC REA	http://externalaction.security-copernicus.eu/	Tools developed as part of other FP7 project	

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
45	CHARTER	Tool	The International Charter aims at providing a unified system of space data acquisition and delivery to those affected by natural or man-made disasters through Authorized Users. Each member agency has committed resources to support the provisions of the Charter and thus is helping to mitigate the effects of disasters on human life and property		http://www.disasterscharter.org/home		
46	GDACS	Tool	GDACS is a cooperation framework under the United Nations umbrella. It includes disaster managers and disaster information systems worldwide and aims at filling the information and coordination gap in the first phase after major disasters.		http://www.gdacs.org/		
47	RELIEFWEB	Tool			http://reliefweb.int/		
48	UN-SPIDER	Tool			http://www.unoosa.org/oosa/en/unspider/index.html		
49	Google Crisis Response	Tool			http://www.google.org/crisisresponse/		

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
50	Cobacore	Knowledge Base	COBACORE (Community Based Comprehensive Recovery) is a research and development project. The COBACORE project build new tools that support local communities in their needs assessments and recovery planning during post-disaster recovery.	FP7 Project	http://cobacore.eu/index.html	Tools developed as part of other FP6/7 projects	May contain tools that could be used as part of DESTRIERO project

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
51	Humanitarian Response	Knowledge Base	Coordinated Assessment Toolkit	UN OCHA	www.humanitarianresponse.info http://www.parkdatabase.org / https://assessments.humanitarianresponse.info/	Operational, Field, Mapping, Data Collection, Decision Support or Intelligence tools used by agencies in this area	• Proposed by UN OCHA's www.humanitarianresponse.info for profiling and assessment activities: www.parkdatabase.org (PARK) • Online database, access and share documents, presentations, tools and guidelines on profiling and assessment activities. • Offers a helping hand to both operational decision-makers and implementation teams by providing access to a range of information about what, when and how to successfully embark on a profiling or assessment activity. • The website contains easily accessible and practical tools that serve to improve planning, implementation, and dissemination of information that articulates the needs of displacement-affected populations. • Weighted spreadsheet matrix https://assessments.humanitarianresponse.info/

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
52	Tsunami Recovery Impact Assessment and Monitoring System	Knowledge Base	The Tsunami Recovery Impact Assessment and Monitoring System (TRIAMS) is a sub-regional initiative that defined, promoted and supported a common system to monitor recovery activities and assess their overall impact in the four countries most affected by the 2004 Indian Ocean earthquake and tsunami – Indonesia, the Maldives, Sri Lanka and Thailand. The purpose of the TRIAMS initiative is to assist governments, aid agencies and affected populations in assessing and monitoring the rate and direction of tsunami recovery in the countries covered over a period of five years.	WHO	http://www.who.int/hac/crises/international/asia_tsunami/triams/en/index.html	Knowledge bases of previous disasters or "snapshots" of pre-disaster situations	• Conceptual framework for analysis of TRIAMS data - Källander, K., & Schreeb, J. Von. (n.d.). • The purpose of the TRIAMS initiative is to assist governments, aid agencies and affected populations in assessing and monitoring the rate and direction of tsunami recovery in the countries covered over a period of five years. • TRIAMS uses indicators in the sectors of Basic Social Services, Livelihoods, Vital Needs and Infrastructure selected by the authorities in the countries and over samplings of tsunami affected districts • TRIAMS is used for MONITORING not coordination
53	UNHCR Emergency IM toolkit	Knowledge Base	EMERGENCY INFORMATION MANAGEMENT TOOLKIT	UNHCR	http://data.unhcr.org/imtoolkit/	Operational, Field, Mapping, Data Collection, Decision Support or Intelligence tools used by agencies in this area	• UNHCR introduced the portals in 2011 to fulfil the institutional responsibility to share detailed operational information with partners, donors, technical experts and staff. Since then, the portals have evolved into a key communication and coordination tool for operations. • They are an authoritative source for up-to-date information in refugee emergencies and are frequently referred to by media. http://data.unhcr.org/imtoolkit/events/index/lang:eng

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
54	Crisis Mappers	Knowledge Base	HUMANITARIAN TECHNOLOGY NETWORK	Crisis Mappers	http://crisismappers.net/	Operational, Field, Mapping, Data Collection, Decision Support or Intelligence tools used by agencies in this area	The International Network of Crisis Mappers is the largest and most active international community of experts, practitioners, policymakers, technologists, researchers, journalists, scholars, hackers and skilled volunteers engaged at the intersection between humanitarian crises, technology, crowd-sourcing, and crisis mapping.
55	SDI4LEB	Knowledge Base	Global Facility for Disaster Reduction and Recovery (GFDRR) is a partnership of 41 countries and 8 international organisations committed to helping developing countries reduce their vulnerability to natural hazards and adapt to climate change. The partnership's mission is to mainstream disaster risk reduction (DRR) and climate change adaptation (CCA) in country development strategies by supporting a country-led and managed implementation of the Hyogo Framework for Action (HFA).	GFDRR	https://www.gfdrr.org/sites/gfdrr.org/files/publication/WRC_ProceedingsMedRes150.pdf		• The reconstruction monitoring system (SDI4LEB) uses open-source web mapping interfaces to display project-related information. • The pop-up window shows an overview of the project status information for the EU-funded construction of a Roumin municipality administration building. • Digital documents and GPS-tagged ground photography for relevant building stages are shown as thumbnails. In the background, recent satellite coverage of the area is displayed.
56	WHO Toolkits (HIA)	Knowledge Base	Tools guides for HIA	WHO	http://www.who.int/hia/tools/toolkit/en/	Operational, Field, Mapping, Data Collection, Decision Support or Intelligence tools used by agencies in this area	

ID	Name	Type	Description	Organisation / Vendor / Owner	URL	Category (Initial)	Notes
57	WHO Toolkits	Knowledge Base	Chemical Hazards – Toolkit	WHO	http://www.who.int/ipcs/methods/harmonization/areas/ra_toolkit/en/	Operational, Field, Mapping, Data Collection, Decision Support or Intelligence tools used by agencies in this area	
58	IASC/NATF	Knowledge Base	Needs Assessment Task Force	UN OCHA	http://www.humanitarianinfo.org/iasc/pageloader.aspx?page=content-subsidi-common-default&sb=75		
59	GFDRR	Knowledge Base		GFDRR			
60	ACAPS	Knowledge Base		NGOs (HelpAge International, Merlin and Norwegian Refugee Council)	http://www.acaps.org/		

APPENDIX B:
QUALITATIVE SCREENING - APPLICABILITY CRITERIA

ID	Name	Type	Dedicated/Non Dedicated	Specific or Generic	Fit for Purpose As Is? (Y/N)	Software Dependency (Y/N)
1	GDACS	Tool	D	G	Y	N
2	DESINVENTAR	Tool	ND	S	Y	N
4	EU ECHO Common Emergency Communication and Information System (CECIS)	Tool	D	S	Y	N
5	Ushahidi	Tool	D	G	Y	N
6	GeoNetwork	Tool	D	G	Y	N
8	Humanitarian Open Street Map	Tool	D	G	Y	N
9	Google Map Maker	Tool	ND	G	N	N
12	Mapbox	Tool	D	G	Y	N
17	GeoNetCap	Knowledge Base	ND	G	N	N
22	Alice System	Tool	D	S	Y	N/A
23	Virtual OSOCC	Tool	ND	G	Y	N/A
24	ELITE	Knowledge Base	D	S	Y	N
25	GeoServer	Tool	D	G	Y	N
26	SAHANA	Tool	D	S	Y	N
27	ESS	Tool	ND	G	N	N
28	INDIGO	Tool	ND	G	N	N
30	1000Minds	Tool	D	S	Y	N
31	D-Sight Desktop	Tool	D	S	Y	N
32	DecisionTools Suite 6.0	Tool	D	S	Y	N
33	Enterprise Portfolio Simulator	Tool	D	S	Y	N

ID	Name	Type	Dedicated/Non Dedicated	Specific or Generic	Fit for Purpose As Is? (Y/N)	Software Dependency (Y/N)
34	Expert Choice Comparison Suite	Tool	D	S	Y	N
38	REACT	Tool	ND	G	N	N
40	Intergraph	Tool	ND	G	Y	N
41	NERIS-TP	Tool	D	S	N	N
42	GIO EMS services	Tool	D	S	Y	N
43	G-NEXT	Tool	D	S	N	N
44	G-SEXTANT	Tool	D	S	N	N
45	CHARTER	Tool	D	S	Y	N
46	GDACS	Tool	D	S	Y	N
47	RELIEFWEB	Tool	D	S	Y	N
48	UN-SPIDER	Tool	D	G	Y	N
49	Google Crisis Response	Tool	D	S	Y	N
50	Cobacore	Knowledge Base	D	S	N	Y
51	Humanitarian Response	Knowledge Base	ND	S	Y	N
52	Tsunami Recovery Impact Assessment and Monitoring System	Knowledge Base	D	S	Y	N
55	SDI4LEB	Knowledge Base	D	G	Y	N
56	WHO Toolkits (HIA)	Knowledge Base	ND	G	N	N
57	WHO Toolkits	Knowledge Base	ND	G	N	N/A
58	IASC/NATF	Knowledge Base	D	S	Y	N
59	GFDRR	Knowledge Base	D	S	Y	N
60	ACAPS	Knowledge Base	D	S	Y	N

APPENDIX C:
QUALITATIVE SCREENING - TECHNICAL FIT CRITERIA

ID	Name	Type	Available (Y/N)	Type/Protocol	Input/Output Format	Embedded Application (Y/N)	Development Platform (Y/N)	Can Use External DB's (Y/N)	Support Custom Algorithms (Y/N)
1	GDACS	Tool	Y	SOAP,HTTP	XML (KML), RSS	Y	N	N	N
2	DESINVENTAR	Tool	Y	XMP-RPC/	XML	N	N	N	N
4	EU ECHO Common Emergency Communication and Information System (CECIS)	Tool	Y	N/A	N/A	N	N	N/A	N
5	Ushahidi	Tool	Y	HTTP	XML, JSON, SMS	N	Y	N	N
6	GeoNetwork	Tool	Y	SOAP/HTTP	XML	Y	Y	Y	N/A
8	Humanitarian Open Street Map	Tool	N			N	N	N	N
9	Google Map Maker	Tool	Y	HTTP	ND	Y	Y	N	N
12	Mapbox	Tool	Y	HTTP/HTTPS	JSONP/TileJSON/HTML	Y	Y	N	N
17	GeoNetCap	Knowledge Base	N/A	N/A	N/A	N/A	N/A	N/A	N/A
22	Alice System	Tool	Y	N/A	N/A	N/A	N/A	N/A	N/A
23	Virtual OSOCC	Tool	Y	SOAP,HTTP	XML (KML), RSS	Y	N		
24	ELITE	Knowledge Base	Y	HTTP	documents, surveys, studies, maps	N/A	N	N	N
25	GeoServer	Tool	Y	HTTP (WMS)	HTTP, GML, JSON	N	Y	N	N

ID	Name	Type	Available (Y/N)	Type/Protocol	Input/Output Format	Embedded Application (Y/N)	Development Platform (Y/N)	Can Use External DB's (Y/N)	Support Custom Algorithms (Y/N)
26	SAHANA	Tool	Y	web Services	XML, CSV, JSON, XLS	N	Y	Y	N/A
27	ESS	Tool	N	N/A	N/A	Y	Y	Y	N
28	INDIGO	Tool	N	N/A	N/A	N/A	Y	N/A	N
30	1000Minds	Tool	Y	N/A	charts	N	N	N	N
31	D-Sight Desktop	Tool	Y	N/A	charts	N	N	N	N
32	DecisionTools Suite 6.0	Tool	Y	N/A	Excel (charts)	N	N	N	N
33	Enterprise Portfolio Simulator	Tool	Y	N/A	charts	N	N	N	N
34	Expert Choice Comparison Suite	Tool	Y	N/A	N/A	N	N	N	N
38	REACT	Tool	N	N/A	N/A	N/A	Y	N	N
40	Intergraph	Tool	Y	WMS, WFS	GML, GEORSS	Y	N	N	N
41	NERIS-TP	Tool	N	HTTP	HTTP	N	N	N	N
42	GIO EMS services	Tool	Y	HTTP	HTTP/SHP/KML/XML	N	N	N	N
43	G-NEXT	Tool	N	HTTP,WMS	HTTP, XML, SHP, KML	N	N	Y	N
44	G-SEXTANT	Tool	N	HTTP	HTTP	N	N	N	N
45	CHARTER	Tool	Y	HTTP	HTTP	N	N	N	N
46	GDACS	Tool	Y	HTTP	HTTP	N	N	N	N
47	RELIEFWEB	Tool	Y	HTTP	HTTP	N	N	N	N
48	UN-SPIDER	Tool	Y	HTTP	HTTP	N	N	N	Y
49	Google Crisis Response	Tool	Y	HTTP	HTTP	Y	N	N	N
50	Cobacore	Knowledge Base	N	N/A	N/A	N	N	N	N

ID	Name	Type	Available (Y/N)	Type/Protocol	Input/Output Format	Embedded Application (Y/N)	Development Platform (Y/N)	Can Use External DB's (Y/N)	Support Custom Algorithms (Y/N)
51	Humanitarian Response	Knowledge Base	Y	RSS feed	maps, documents	N	N	N	N
52	Tsunami Recovery Impact Assessment and Monitoring System	Knowledge Base	Y	N/A	documents, surveys, studies, maps	N/A	N	N	N
55	SDI4LEB	Knowledge Base	Y	HTTP	N/A	N/A	N/A	N/A	N/A
56	WHO Toolkits (HIA)	Knowledge Base	Y	HTTP	RSS	N	N	N	N
57	WHO Toolkits	Knowledge Base	Y	HTTP	RSS	N	N	N	N
58	IASC/NATF	Knowledge Base	N/A	N/A	N/A	N	N	N	N
59	GFDRR	Knowledge Base	N/A	N/A	N/A	N	N	N	N
60	ACAPS	Knowledge Base	N/A	N/A	N/A	N	N	N	N

APPENDIX D:
QUALITATIVE SCREENING - COST & LICENSING CRITERIA

ID	Name	Type	Cost (Free/Low/High)	Licensing Constraints	Open Source (Y/N)
1	GDACS	Tool	F	N/A	N
2	DESINVENTAR	Tool	F	N	Y
4	EU ECHO Common Emergency Communication and Information System (CECIS)	Tool	N/A	N/A	N/A
5	Ushahidi	Tool	F	LGPL	Y
6	GeoNetwork	Tool	F	N	Y
8	Humanitarian Open Street Map	Tool	F	F	N
9	Google Map Maker	Tool	F	N	Y
12	Mapbox	Tool	L	L	N
17	GeoNetCap	Knowledge Base	N/A	N/A	N/A
22	Alice System	Tool	N/A	N/A	N
23	Virtual OSOCC	Tool	F	N/A	N
24	ELITE	Knowledge Base	F	N	N
25	GeoServer	Tool	F	GPL	Y
26	SAHANA	Tool	F	N/A	Y
27	ESS	Tool	N/A	N/A	N
28	INDIGO	Tool	N/A	N/A	N
30	1000Minds	Tool	L	Y	N
31	D-Sight Desktop	Tool	L	Y	N
32	DecisionTools Suite 6.0	Tool	L	Y	N
33	Enterprise Portfolio Simulator	Tool	N/A	Y	N
34	Expert Choice Comparison Suite	Tool	N/A	Y	N

ID	Name	Type	Cost (Free/Low/High)	Licensing Constraints	Open Source (Y/N)
38	REACT	Tool	N/A	N/A	N
40	Intergraph	Tool	H	Y	N
41	NERIS-TP	Tool	F	N/A	N
42	GIO EMS services	Tool	F	N/A	N
43	G-NEXT	Tool	F	N/A	N
44	G-SEXTANT	Tool	F	N/A	N
45	CHARTER	Tool	F	N/A	N
46	GDACS	Tool	F	N/A	N
47	RELIEFWEB	Tool	F	N/A	N
48	UN-SPIDER	Tool	F	N/A	N
49	Google Crisis Response	Tool	F	N/A	N
50	Cobacore	Knowledge Base	N/A	N/A	N/A
51	Humanitarian Response	Knowledge Base	F	N/A	N
52	Tsunami Recovery Impact Assessment and Monitoring System	Knowledge Base	N/A	N/A	N/A
55	SDI4LEB	Knowledge Base	F	N/A	N/A
56	WHO Toolkits (HIA)	Knowledge Base	F	N	N
57	WHO Toolkits	Knowledge Base	F	N	N
58	IASC/NATF	Knowledge Base	N/A	N/A	N/A
59	GFDRR	Knowledge Base	N/A	N/A	N/A
60	ACAPS	Knowledge Base	N/A	N/A	N/A

APPENDIX E:
QUALITATIVE SCREENING - QUALITY CRITERIA

ID	Name	Type	Currency of Tool/Content (Y/N)	Accuracy & Quality (High/Med/Low)	Security & Privacy (High/Low)	Reliability & Support (High/Low)
1	GDACS	Tool	Y	H	N/A	H
2	DESINVENTAR	Tool	Y	H	L	H
4	EU ECHO Common Emergency Communication and Information System (CECIS)	Tool	Y	H	H	H
5	Ushahidi	Tool	N/A	N/A	N/A	L
6	GeoNetwork	Tool	Y	H	H	H
8	Humanitarian Open Street Map	Tool	N/A	N/A	N/A	L
9	Google Map Maker	Tool	N	M	L	H
12	Mapbox	Tool	N/A	N/A	N/A	H
17	GeoNetCap	Knowledge Base	Y	M	N/A	H
22	Alice System	Tool	N/A	N/A	N/A	N/A
23	Virtual OSOCC	Tool	Y	H	N/A	H
24	ELITE	Knowledge Base	Y	H	L	N/A
25	GeoServer	Tool	Y	H	N/A	L
26	SAHANA	Tool	Y	H	N/A	H
27	ESS	Tool	N	N/A	N/A	L
28	INDIGO	Tool	N	N/A	N/A	L
30	1000Minds	Tool	Y	N/A	H	L
31	D-Sight Desktop	Tool	Y	N/A	N/A	H
32	DecisionTools Suite 6.0	Tool	Y	N/A	N/A	H

ID	Name	Type	Currency of Tool/Content (Y/N)	Accuracy & Quality (High/Med/Low)	Security & Privacy (High/Low)	Reliability & Support (High/Low)
33	Enterprise Portfolio Simulator	Tool	Y	H	N/A	N/A
34	Expert Choice Comparison Suite	Tool	Y	N/A	N/A	N/A
38	REACT	Tool	N	N/A	N/A	L
40	Intergraph	Tool	Y	H	N/A	H
41	NERIS-TP	Tool	Y	M	N/A	N/A
42	GIO EMS services	Tool	Y	H	H	H
43	G-NEXT	Tool	Y	M	H	L
44	G-SEXTANT	Tool	Y	M	H	L
45	CHARTER	Tool	Y	H	H	H
46	GDACS	Tool	Y	H	H	H
47	RELIEFWEB	Tool	Y	H	H	H
48	UN-SPIDER	Tool	Y	H	H	H
49	Google Crisis Response	Tool	Y	H	H	H
50	Cobacore	Knowledge Base	Y	H	N/A	H
51	Humanitarian Response	Knowledge Base	Y	H	H	H
52	Tsunami Recovery Impact Assessment and Monitoring System	Knowledge Base	Y	H	N/A	N/A
55	SDI4LEB	Knowledge Base	Y	N/A	N/A	N/A
56	WHO Toolkits (HIA)	Knowledge Base	Y	H	N/A	H
57	WHO Toolkits	Knowledge Base	Y	H	N/A	H
58	IASC/NATF	Knowledge Base	Y	H	N/A	H
59	GFDRR	Knowledge Base	Y	H	N/A	H
60	ACAPS	Knowledge Base	Y	H	N/A	H

APPENDIX F:
QUALITATIVE SCREENING - USABILITY CRITERIA

ID	Name	Type	Endorsed/Recommended (High/Low)	Usability/Ease of Use (High/Med/Low)	Documentation/ Help (Y/N)
1	GDACS	Tool	H	M	Y
2	DESINVENTAR	Tool	H	H	Y
4	EU ECHO Common Emergency Communication and Information System (CECIS)	Tool	H	N/A	N/A
5	Ushahidi	Tool	L	M	Y
6	GeoNetwork	Tool	H	M	Y
8	Humanitarian Open Street Map	Tool	L	L	Y
9	Google Map Maker	Tool	L	M	Y
12	Mapbox	Tool	L	M	Y
17	GeoNetCap	Knowledge Base	N/A	M	Y
22	Alice System	Tool	H	N/A	Y
23	Virtual OSOCC	Tool	H	M	Y
24	ELITE	Knowledge Base	N/A	H	Y
25	GeoServer	Tool	L	M	Y
26	SAHANA	Tool	H	H	Y
27	ESS	Tool	N/A	N/A	N/A
28	INDIGO	Tool	N/A	N/A	N/A
30	1000Minds	Tool	L	L	Y
31	D-Sight Desktop	Tool	L	N/A	Y
32	DecisionTools Suite 6.0	Tool	L	N/A	Y

ID	Name	Type	Endorsed/Recommended (High/Low)	Usability/Ease of Use (High/Med/Low)	Documentation/ Help (Y/N)
33	Enterprise Portfolio Simulator	Tool	L	L	Y
34	Expert Choice Comparison Suite	Tool	L	N/A	N/A
38	REACT	Tool	N/A	N/A	N/A
40	Intergraph	Tool	H	H	Y
41	NERIS-TP	Tool	L	L	N
42	GIO EMS services	Tool	H	H	Y
43	G-NEXT	Tool	N/A	M	Y
44	G-SEXTANT	Tool	N/A	M	Y
45	CHARTER	Tool	H	H	Y
46	GDACS	Tool	H	H	Y
47	RELIEFWEB	Tool	H	M	Y
48	UN-SPIDER	Tool	H	H	Y
49	Google Crisis Response	Tool	H	M	Y
50	Cobacore	Knowledge Base	H	M	Y
51	Humanitarian Response	Knowledge Base	H	M	Y
52	Tsunami Recovery Impact Assessment and Monitoring System	Knowledge Base	H	N/A	N/A
55	SDI4LEB	Knowledge Base	H	M	Y
56	WHO Toolkits (HIA)	Knowledge Base	Y	M	N
57	WHO Toolkits	Knowledge Base	Y	M	N
58	IASC/NATF	Knowledge Base	Y	M	Y
59	GFDRR	Knowledge Base	Y	M	Y
60	ACAPS	Knowledge Base	Y	M	Y

APPENDIX G:
QUALITATIVE SCREENING - OBJECTIVES CRITERIA

ID	Name	Type	Data Collection (Y/N)	Presentation of Information (Y/N)	Decision Making (Y/N)	Interoperability (Y/N)
1	GDACS	Tool	Y	Y	Y	N
2	DESINVENTAR	Tool	Y	Y	Y	N
4	EU ECHO Common Emergency Communication and Information System (CECIS)	Tool	Y	N	N	Y
5	Ushahidi	Tool	Y	Y	Y	Y
6	GeoNetwork	Tool	Y	Y	Y	Y
8	Humanitarian Open Street Map	Tool	Y	Y	Y	Y
9	Google Map Maker	Tool	Y	Y	N	N
12	Mapbox	Tool	Y	Y	Y	Y
17	GeoNetCap	Knowledge Base	Y	Y	Y	N
22	Alice System	Tool	Y	Y	Y	Y
23	Virtual OSOCC	Tool	Y	Y	Y	N
24	ELITE	Knowledge Base	Y	N	N	N
25	GeoServer	Tool	Y	Y	Y	Y
26	SAHANA	Tool	Y	Y	N	Y
27	ESS	Tool	Y	N/A	Y	Y
28	INDIGO	Tool	N	Y	Y	Y
30	1000Minds	Tool	N	N	Y	N
31	D-Sight Desktop	Tool	N	N	Y	N
32	DecisionTools Suite 6.0	Tool	N	N	Y	N
33	Enterprise Portfolio Simulator	Tool	N	N	Y	N

ID	Name	Type	Data Collection (Y/N)	Presentation of Information (Y/N)	Decision Making (Y/N)	Interoperability (Y/N)
34	Expert Choice Comparison Suite	Tool	N	N	Y	N
38	REACT	Tool	Y	Y	Y	Y
40	Intergraph	Tool	Y	Y	Y	Y
41	NERIS-TP	Tool	N	N	N	N
42	GIO EMS services	Tool	Y	Y	y	Y
43	G-NEXT	Tool	Y	Y	Y	N
44	G-SEXTANT	Tool	Y	Y	Y	N
45	CHARTER	Tool	Y	Y	Y	Y
46	GDACS	Tool	Y	Y	N/A	Y
47	RELIEFWEB	Tool	Y	Y	N/A	Y
48	UN-SPIDER	Tool	N/A	Y	N	Y
49	Google Crisis Response	Tool	Y	Y	N/A	Y
50	Cobacore	Knowledge Base	Y	N	Y	N
51	Humanitarian Response	Knowledge Base	Y	Y	N/A	Y
52	Tsunami Recovery Impact Assessment and Monitoring System	Knowledge Base	Y	N	N	N
55	SDI4LEB	Knowledge Base	N/A	N/A	Y	Y
56	WHO Toolkits (HIA)	Knowledge Base	Y	N	Y	N
57	WHO Toolkits	Knowledge Base	Y	N	Y	N
58	IASC/NATF	Knowledge Base	Y	N	Y	N
59	GFDRR	Knowledge Base	Y	N	Y	N
60	ACAPS	Knowledge Base	Y	N	Y	N

APPENDIX H:
QUANTITATIVE EVALUATION FULL RANKINGS

ID	Tool/Resource	Type	Overall Rank	Data Collection Rank	Presentation Rank	Decision Making Rank	Interoperability Rank	Pillars Rank
42	GIO EMS services	Tool	**1**	1	1	1	1	1
45	CHARTER	Tool	**2**	1	1	1	15	6
25	GeoServer	Tool	**3**	1	1	1	1	1
40	Intergraph	Tool	**3**	1	1	1	1	1
51	Humanitarian Response	Knowledge Base	**5**	1	1	32	1	9
1	GDACS	Tool	**6**	1	1	1	15	6
22	Alice System	Tool	**7**	1	1	1	1	1
8	Humanitarian Open Street Map	Tool	**7**	1	1	1	15	6
6	GeoNetwork	Tool	**7**	25	1	1	15	9
23	Virtual OSOCC	Tool	**10**	1	1	1	21	9
48	UN-SPIDER	Tool	**11**	30	1	32	1	20
2	DESINVENTAR	Tool	**11**	1	1	1	21	9
46	GDACS	Tool	**13**	30	1	32	1	20
58	IASC/NATF	Knowledge Base	**13**	1	25	1	21	20
60	ACAPS	Knowledge Base	**13**	1	25	1	21	20
26	SAHANA	Tool	**16**	1	1	32	1	9
59	GFDRR	Knowledge Base	**16**	1	25	1	21	20
49	Google Crisis Response	Tool	**18**	30	1	32	1	20
50	Cobacore	Knowledge Base	**19**	1	25	1	21	20

ID	Tool/Resource	Type	Overall Rank	Data Collection Rank	Presentation Rank	Decision Making Rank	Interoperability Rank	Pillars Rank
17	GeoNetCap	Knowledge Base	**20**	1	21	1	21	16
38	REACT	Tool	**21**	1	1	1	1	1
4	EU ECHO Common Emergency Communication and Information System (CECIS)	Tool	**21**	1	25	32	1	20
12	Mapbox	Tool	**23**	25	1	28	15	16
43	G-NEXT	Tool	**23**	1	21	1	21	16
44	G-SEXTANT	Tool	**23**	1	21	1	21	16
55	SDI4LEB	Knowledge Base	**26**	30	25	1	1	20
5	Ushahidi	Tool	**26**	25	21	28	15	20
24	ELITE	Knowledge Base	**26**	1	25	32	21	31
47	RELIEFWEB	Tool	**26**	30	1	32	21	31
27	ESS	Tool	**30**	1	25	1	1	9
28	INDIGO	Tool	**30**	30	1	1	1	9
52	Tsunami Recovery Impact Assessment and Monitoring System	Knowledge Base	**30**	1	25	32	21	31
9	Google Map Maker	Tool	**33**	1	1	32	21	20
41	NERIS-TP	Tool	**34**	30	25	32	21	42
33	Enterprise Portfolio Simulator	Tool	**35**	30	25	1	21	31
30	1000Minds	Tool	**36**	30	25	1	21	31
31	D-Sight Desktop	Tool	**37**	30	25	1	21	31
32	DecisionTools Suite 6.0	Tool	**37**	30	25	1	21	31
34	Expert Choice Comparison Suite	Tool	**37**	30	25	1	21	31

ID	Tool/Resource	Type	Overall Rank	Data Collection Rank	Presentation Rank	Decision Making Rank	Interoperability Rank	Pillars Rank
56	WHO Toolkits (HIA)	Knowledge Base	**41**	25	25	28	21	31
57	WHO Toolkits	Knowledge Base	**41**	25	25	28	21	31