

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

D4.1 – Information Demand and Information Origin

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TABLE OF ACRONYMS

3W	Who What Where
AIDMI	All India Disaster Mitigation Institute
AIDMI	All India Disaster Mitigation Institute
ALNAP	Active Learning Network for Accountability and Performance in Humanitarian Action
AMI	Fundação Assistência Médica Internacional (International Medical Assistance Foundation) a DESTRIERO Consortium Member
AMPER	AMPER PROGRAMAS a DESTRIERO Consortium Member
API	Application Programming Interface
BCP	Business Continuity Plans
CDAAAM	Community Damage Assessment and Demand Analysis Methodology
COD	Common Operational Datasets
CRIP	Common Recognised Information Picture
CSV	Comma-Separated Values
DaLA	Damage, Loss and Needs Assessment
DDR	Disaster Risk Reduction
DVI	Disaster Victim Identification
ECLAC	Economic Commission for Latin America and the Caribbean
E-GEOS	e-GEOS a DESTRIERO Consortium Member
EU	European Union
FHG	Fraunhofer Institute for Industrial Engineering IAO a DESTRIERO Consortium Member
GDACS	Global Disaster Alert and Coordination System
GDP	Gross Domestic Product
GFDRR	Global Facility for Disaster Reduction and Recovery
GFDRR	Global Facility for Disaster Reduction and Recovery
GIO EMS	GIO Emergency Management Service
GMES	Global Monitoring for Environment and Security



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HAP	Humanitarian Accountability Partnership
HDI	Human Development Index
HFA	Hyogo Framework for Action
HMI	Human Machine Interface
HTTPS	Hypertext Transfer Protocol Secure
IASC	Inter-Agency Standing Committee
IEM	Integrated Emergency Management
IFRC	International Federation of Red Cross and Red Crescent Societies
IO	International Organisation
IRIN	Integrated Regional Information Networks
ITTI	ITTI Sp. z o.o. a DESTRIERO Consortium Member
JSON	JavaScript Object Notation
LPS	Land and Property Services
MIRA	Multi Cluster/Sector Initial Rapid Assessment
MRAHA	Methodology for Rapid Assessment for Humanitarian Assistance
NATF	Needs Assessment Task Force
NGOs	Non-governmental Organizations
PDNA	Post-Disaster Needs Assessments
PSNI	Police Service of Northern Ireland
PSNI	Police Service of Northern Ireland a DESTRIERO Consortium Member
REDLAC	The Risk, Emergency and Disasters Task Force Inter-Agency Workgroup for Latin America and the Caribbean
REDLAC	The Work Group for Risk, Emergencies and Disasters for the region's Interagency Standing Committee
RNA	Rapid Needs Assessment
RRP	Recovery and Reconstruction Planning
SAADIAN	Saadian Technologies Limited a DESTRIERO Consortium Member
SESM	Sesm Soluzioni Evolute per la Sistemistica e i Modelli a DESTRIERO Consortium Member



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SGSP	Slozkola Glowna Sluzby Pozarniczej (Main School of Fire Service in Poland) a DESTRIERO Consortium Member
SRFF	Standby Recovery Financing Facility
SRG	Strategic Recovery Group
STAC	Science and Technical Advice Cell
THALES	Thales Research & Technology a DESTRIERO Consortium Member
TRIAMS	Tsunami Recovery Impact Assessment and Monitoring System
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNITAR	UN Institute for Training and Research
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
UNOSAT	UN Operational Satellite Applications Programme
WHO	World Health Organization
XML	Extensible Markup Language



1 Introduction

In humanitarian relief information is crucial in order to make the right decisions, optimize resource management and get the best possible outcomes. Thus information management in terms of matching the information demands with the available information sources is a core challenge of a crisis information management system like DESTRIERO. Therefore the present document illustrates the existing and demanded information during the different activities of recovery and reconstruction. Additionally frameworks are presented that can be used to structure the information or help to judge their quality and/or the trustworthiness of the source. With regards to the presented information sources and structures aspects of interoperability are discussed. Finally, out of all these aspects main features for a DESTRIERO information model are derived.

At the beginning chapter 2 provides an overview about state of the art information sources in relation with crisis management and which are potentially relevant for the DESTRIERO. Provided information can be structured and used for various treatments within DESTRIERO platform. The objective of chapter 3 is to capture from different PDNA/RRP methodologies the available information, and how the information is organized, from general topics and sub topics (infrastructure, transport infrastructure etc.) to concrete indicators (number of bridges repaired). Each methodology is presented according to its own information structure.

Chapter 4 focuses on information in DESTRIERO itself, knowing that DESTRIERO is not described and specified in complete detail yet. Therefore the involved end-users describe their information demand for their duties. Also the information requirements from two information systems – Myriad and WebGIS – which should be supported by DESTRIERO are outlined. Vice versa the provided information from these two systems is described in detail. The identified information sources and information structures from the beginning are systematically processed regarding interoperability aspects in chapter 5. Thus the important attributes (content type, API/protocol, context, etc.) are provided in an easy-to-read table format.

In chapter 6 a framework for information quality is presented and an introduction into the basic principles of the levels of trust is given. Thus this section serves as a starting point for the development of a DESTRIERO information reliability framework in D4.2. This framework will operationalize the given generic approaches in the following paragraphs and adopted them to the DESTRIERO environment and the context of humanitarian aid. Finally, chapter 7 combines the findings of all previous chapters as well as available DESTRIERO deliverables into an exemplified information model. Therefore descriptors are selected to characterize the information in DESTRIERO and examples of their use are given. The document closes with conclusions in chapter 8.



2 State Of The Art on Information Sources

Information sources detailed here are organisations or services that provide various kind of reliable information (in-depth analytical publications, daily situation reports, disaster maps, databases etc.) in relation with crisis management, potentially relevant for the DESTRIERO platform. Provided information can be structured and used for various treatments within DESTRIERO platform, or unstructured (like textual information) and directly shown to end-users on DESTRIERO human machine interface (HMI).

We do not detail here raw sources like administrations (national or local) and first responder services that provide partial and raw data (like the number of death, and various information obtained through questionnaires addressed to the population), since those data are used as input by the following organisations.

2.1 UNOCHA

Presentation

The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) is the part of the United Nations Secretariat responsible for bringing together humanitarian actors to ensure a coherent response to emergencies. OCHA also ensures there is a framework within which each actor can contribute to the overall response effort.

OCHA's mission is to:

- Mobilize and coordinate effective and principled humanitarian action in partnership with national and international actors in order to alleviate human suffering in disasters and emergencies.
- Advocate the rights of people in need.
- Promote preparedness and prevention.
- Facilitate sustainable solutions.

Website: <http://www.unocha.org/>

Information description and usage context

OCHA produces an array of reports and publications, from in-depth analytical papers, to daily situation reports on major new crises. 'OCHA on-Message' is a new reference series that enables them to communicate OCHA's definition of and better advocate action on a range of complex issues and concepts such as protection of civilians, internal displacement, and humanitarian access.

When an emergency occurs, OCHA's information management officers immediately start working with key partners to produce standard information products to support coordination of all the humanitarian organizations and the response operation. These include the Who What Where (3W) database, contact lists and meeting schedules. A tool



such as the information needs assessment and maps are made available to support better relief planning and action.

2.2 WHO

Presentation

The World Health Organization (WHO) is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries and monitoring and assessing health trends.

Website: <http://www.who.int/en/>

Information description and usage context

The WHO provides regularly articles and reports on health, and has collaborated to the TRIAMS (Tsunami Recovery Impact Assessment and Monitoring System).

2.3 GDACS

Presentation

Global Disaster Alert and Coordination System (GDACS) is a cooperation framework under the United Nations umbrella. It includes disaster managers and disaster information systems worldwide and aims at filling the information and coordination gap in the first phase after major disasters.

GDACS provides real-time access to web-based disaster information systems and related coordination tools.

Website: <http://www.gdacs.org/>

Information description and usage context

GDACS provides alerts and impact estimations after major disasters through a multi-hazard disaster impact assessment service managed by the European Commission Joint Research Centre. To this end, JRC establishes scientific partnerships with global hazard monitoring organisations. Flood disasters are provided by the Dartmouth Flood Observatory. Relevant data is integrated automatically into GDACS alerts and impact estimations.

GDACS develops standards and guidelines for international information exchange in disasters.

GDACS provides the real-time coordination platform “VirtualOSOCC” (<http://vosocc.gdacs.org>) to disaster managers worldwide.



GDACS coordinates the creation and dissemination of disaster maps and satellite images. This service is facilitated by the UN Institute for Training and Research (UNITAR) Operational Satellite Applications Programme (UNOSAT). Relevant maps are integrated automatically in VirtualOSOCC disaster discussions.

Detailed weather forecast are provided rapidly on demand by SARWeather and integrated into VirtualOSOCC disaster discussions.

2.4 ECLAC

Presentation

The Economic Commission for Latin America and the Caribbean (ECLAC), which is headquartered in Santiago, Chile, is one of the five regional commissions of the United Nations. It was founded with the purpose of contributing to the economic development of Latin America, coordinating actions directed towards this end, and reinforcing economic ties among countries and with other nations of the world. The promotion of the region's social development was later included among its primary objectives.

Website: <http://www.eclac.cl/>

Information description and usage context

They publish studies and reports on the consequences of natural disasters in their area e.g.: Socioeconomic vulnerability to natural disasters in Mexico: rural poor, trade and public response (2007); Suriname: the impact of the May 2006 floods on sustainable livelihoods (2007); Handbook for Estimating the Socio-economic and Environmental Effects of Disasters (2003); Belize, Macro socio-economic assessment of the damage and losses caused by Tropical Depression 16 (2009).

One of their main publications in relation with the assessment of disaster effects is the Handbook for Estimating the Socio-Economic and Environmental Effects of Disasters. In this handbook, regularly revised and extended, they propose an assessment methodology. The Damage, Loss and Needs Assessment (DaLA) methodology (detailed below) is based on this ECLAC methodology.

2.5 GFDRR

Presentation

Established in 2006, the Global Facility for Disaster Reduction and Recovery (GFDRR) is a partnership of 35 countries and six international organizations 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 (DDR) and climate change adaptation in country development strategies by supporting a country-led and



country-managed implementation of the Hyogo Framework for Action (HFA). The GFDRR is managed by the World Bank.

Website: <https://www.gfdr.org/>

Information description and usage context

Their main publication in relation with the assessment of disaster effects is the DaLA Guidance Notes. The DaLA methodology was prepared by GFDRR to help practitioners and staff from national and international agencies to assess the impact of disasters and to develop the recovery and reconstruction framework. The DaLA methodology expands the original ECLAC methodology by including into the assessment process the estimates of recovery and reconstruction needs.

2.6 Reliefweb

Presentation

ReliefWeb has been the leading source for reliable and timely humanitarian information on global crises and disasters since 1996. ReliefWeb is a specialized digital service of the United Nations Office for the Coordination of Humanitarian Affairs (OCHA). Its editorial insight, combined with access to the latest technology, allows them to provide innovative, reliable and informative products and services on a continuous, global basis. They are able to collect updates and analysis from more than 4,000 global information sources around the clock. As part of our commitment to humanitarians worldwide, they develop new information products and services that enable humanitarian partners to analyze context and situations and make better decisions.

Website: <http://reliefweb.int>

Information description and usage context

It provides reliable disaster and crisis updates and analysis to humanitarians, so they can make informed decisions and plan effective assistance. ReliefWeb offers information as Reports, such as analysis, appeals, assessments, situation reports, but also maps information and financial data.

2.7 IRIN News

Presentation

IRIN – standing for Integrated Regional Information Networks – is a news and analysis service covering the parts of the world often under-reported, misunderstood or ignored. It was launched in 1995, in response to the gap in humanitarian reporting exposed by the Rwandan genocide and its aftermath. It is an editorially independent, non-profit project of the UN Office for the Coordination of Humanitarian Affairs (OCHA), funded entirely by voluntary contributions from governments and other institutions. It delivers unique



reporting from the frontlines of humanitarian action to over a million online readers. IRIN is the premier online humanitarian news source for people who describe themselves as having a "strong impact on humanitarian issues". Its reports are used directly in planning, advocacy and policy development.

Website: <http://www.irinnews.org/>

Information description and usage context

The global text service produces over 400 reports a month, with correspondents in crisis spots from Afghanistan to Somalia. IRIN also has dedicated coverage of climate change and food security, and a specialist HIV/AIDS service, PlusNews.

As the news service of the aid industry, IRIN operates like a regular news operation, but with the advantage of privileged access. That gives a unique close-up perspective on the humanitarian enterprise, on-the-ground reporting on crisis and vulnerability, and early warning on brewing emergencies.

2.8 ALNAP

Presentation

The Active Learning Network for Accountability and Performance in Humanitarian Action (ALNAP) was established in 1997, following the multi-agency evaluation of the Rwanda genocide.

The Active Learning Network for Accountability and Performance in Humanitarian Action (ALNAP) is a system-wide organisation dedicated to improving the accountability and performance of humanitarian action by strengthening the humanitarian evidence base through sharing lessons, researching key issues and, where appropriate, providing leadership to find collective approaches and solutions.

ALNAP members actively support the secretariat by providing specialist advice and support and physical resources and assisting with dissemination, take-up and use of ALNAP materials within their own organisation and in the wider humanitarian community.

Website: www.alnap.org

Information description and usage context

The ALNAP Secretariat is responsible for delivering an annual work plan that has been informed by the needs of the membership and approved by the steering committee.

The first State of the Humanitarian System report 2012 is an ambitious snapshot of the entire humanitarian system: it outlines what's working, what's not, and how the sector has been performing in 2009-2010. Uniquely, it incorporates perspectives from those who receive aid, as well as practitioners from across the globe and at all levels of seniority.



ALNAP and CDA Collaborative Learning Projects have just finalised a research project on feedback mechanisms in a variety of humanitarian emergency settings. The aim was to document what works and why when using beneficiary feedback mechanisms; to capture learning from field staff; and to include beneficiaries' voices into these on-going discussions. A feedback mechanism is a set of procedures and tools formally established and used to allow humanitarian aid recipients (and in some cases other crisis-affected populations) to provide information on their experience of a humanitarian agency or of the wider humanitarian system. Feedback mechanisms can function as part of broader monitoring practices and can generate information for decision-making purposes. Feedback mechanisms collect information for a variety of purposes, including taking corrective action in improving some elements of the humanitarian response, and strengthening accountability towards affected populations.

2.9 HAP

Presentation

Established in 2003, the Humanitarian Accountability Partnership (HAP) International is the humanitarian sector's first international self-regulatory body. It is a partnership of humanitarian and development organisations dedicated to ensuring greater accountability to people affected by crises through the promotion of a Standard on Quality and Accountability. It also certifies organisations against the Standard. HAP believes that organisations in charge better meet people's needs, and reduces the possibility of mistakes, abuse and corruption.

The objectives of HAP are:

- To develop and maintain the HAP Standard through research, consultation, and collaboration;
- To support members and potential members of HAP in applying the HAP Standard by providing training and advice;
- To communicate, advocate, promote, and report on the HAP Standard;
- To monitor and report on implementation of the HAP Standard and to certify its members accordingly and
- To assist members in finding solutions where concerns or complaints are raised about them.

Website: <http://www.hapinternational.org/>

Information description and usage context

The Humanitarian Accountability Partnership provides a number of services to help humanitarian and development organisations become more accountable to the people they serve:



- The 2010 HAP Standard: The purpose of the HAP Standard is to help organisations design, implement, assess, improve and recognise accountable programmes. It outlines the policies, processes, procedures and practices that an organisation needs in order to be accountable to crisis-affected communities.
- The Core Humanitarian Standard: The Core Humanitarian Standard supports humanitarian actors to apply fundamental humanitarian and human rights principles, improve the quality and effectiveness of assistance, and bring greater accountability to communities and people affected by disaster. The elements of the Standard are as follows:
 - Commitments: Qualitative in nature, they are conditions and conduct that should be met if an organisation wants to be professional, credible and responsible in any humanitarian response.
 - Core requirements: Organisation-specific steps and actions to be undertaken by an organisation through its management, staff and volunteers to meet the commitments
 - Indicators: Measurable attributes that allow the humanitarian community to judge whether commitments are being met
 - Means of verification: Sources of information to measure the key indicators and therefore validate whether or not the core requirements are being met
- Certification: The HAP Certification Scheme provides a rigorous verification of an organisation's accountability and quality management. When an organisation is HAP-certified, it means that it is compliant with the 2010 HAP Standard in Accountability and Quality Management. HAP promotes certification because it is the most effective way to help organisations achieve and get recognition for their commitment to quality management and accountability to the people they aim to assist. HAP has worked extensively to research the benefits of its Certification Scheme, both through looking at the impact of accountability mechanisms, and through focus group discussions with those organisations that have undergone a HAP Certification Audit.
- Deployments: HAP has a team dedicated to provide hands-on and immediate support to organisations working in aid assistance in humanitarian and development settings. This team is deployed to strengthen the capacity of organisations committed to improving their quality and accountability towards crisis-affected communities. The activities of each deployment are unique and based on the prevailing contextual constraints, the dynamics of the response, and tailored to the needs of the organisations on the ground, their staff and crisis-affected communities.
- Responding to emergencies: To assist with their work in these challenging environments, and in addition to HAP's own deployments, HAP provides key information for people working in specific emergencies, assisting with the accountability efforts remotely and, where possible, on the ground.



2.10 People In Aid

Presentation

People In Aid improves organisational effectiveness within the humanitarian and development sector worldwide by advocating, supporting and recognising good practice in the management of people.

Established by agencies in the humanitarian and development sector in 1995, they are a not-for-profit membership organisation. They are governed by members, whose experiences and HR practices shape activities and have informed the cornerstone of their work, the People In Aid Code of Good Practice in the management and support of aid personnel.

Website: www.peopleinaid.org

Information description and usage context

Over the past years they have provided seminal research, with unparalleled networking opportunities, with information and benchmarking to make organizations job easier, with training and, above all, with recognition of achievements and commitment through certification.

They provide work plans based on area of interest and experience of members, defined into the People In Aid Code. They define members' priorities through a mixture of services and outputs including research, publications, workshops, conferences, interactive forums, benchmarking, audit and certification, networking and advocacy.

2.11 AIDMI

Presentation

The All India Disaster Mitigation Institute (AIDMI) is a registered non-governmental organization based in Ahmedabad, Gujarat, India. It is a community-based action planning, action research and advocacy organization, working towards bridging the gap between policy, practice and research related to disaster mitigation. Established after the 1987–89 Gujarat droughts, AIDMI has expanded its work over the years to cover nine types of disasters in twelve areas of India and beyond to eight countries in Asia. AIDMI strives to link local communities to national and international levels of risk reduction, relief and long-term recovery policies and programs. As an operational and learning organization, AIDMI works towards promoting Disaster Risk Mitigation and Adaptation to climate change risk by supporting, capturing, processing and disseminating disaster related information, lessons and innovative ideas as well as conducting stakeholder round tables, trainings of trainers, reviews, evaluations, and pilot projects.

AIDMI's mission is to mainstream disaster risk reduction by turning disaster relief and rehabilitation into an opportunity for sustainable human development and poverty alleviation by supporting poor and marginalized citizens.



Website: <http://www.aidmi.org/>

Information description and usage context

AIDMI has conducted over 28 evaluations of disaster risk management in South and Southeast Asia. AIDMI has been a leader in developing the practice of independent and joint evaluations of humanitarian efforts in the region. In this emerging area, AIDMI has captured and shared insights into how joint evaluations can improve accountability, ownership and management in favour of the poor and affected community. Awareness Materials – posters, brochures, displays, reports, study materials, video documentary – for knowledge sharing are disseminated all across the world online.

2.12 REDLAC

Presentation

The Risk, Emergency and Disasters Task Force Inter-Agency Workgroup for Latin America and the Caribbean (REDLAC) was created in 2003 as an interagency workgroup inspired by the global level Inter-Agency Standing Committee (IASC) to develop an exchange platform for information and the discussion of humanitarian matters. REDLAC includes more than 27 members from United Nations agencies, the Red Cross Movement, Non-governmental Organizations (NGOs) and donors committed to the association principles of the global humanitarian platform. Its mission is to increase the impact of humanitarian action for the benefit of vulnerable populations in Latin America and the Caribbean through the coordination of humanitarian actors and support to public institutions and civil society. Specifically, REDLAC aims to increase cooperation in disaster reduction, preparation and response through information exchange, joint planning and common activities. In 2006, the regional interagency group REDLAC designed the Rapid Needs Assessment (RNA) a methodology for rapid assessment of humanitarian needs for humanitarian teams in countries to facilitate the preliminary assessment of damage in the initial stages of an emergency. The basic data collected through this methodology should be classified by sector to facilitate future operations of the specialized agencies.

Website: <http://www.redhum.org>

Information description and usage context

REDLAC promotes information sharing through redhum.org and the production of materials such as the REDLAC Weekly Note on Emergencies and maps. Redhum is both a website and a regional network with 11 representatives within emergency management offices. It is an interagency regional project coordinated by the OCHA Regional Office and supported by organizations in the REDLAC group to promote efficient information management. Redhum's purpose is to make the processes of information management known in order to facilitate the relationship between humanitarian actors. This includes promoting and establishing access to timely, high quality information. The Redhum disseminates official documents,



news, maps, activities contact lists and images related to humanitarian issues. The Redhum team works to disseminate concepts and good practices about information management to the humanitarian community. One of their main publications in relation with the assessment of disaster effects is “Methodology Rapid Assessment for Humanitarian Assistance” in which RNA methodology is described.

The Redhum has a database with over 35,000 records and information which is easy to access through search engines and filters. Redhum maintains a presence on several social networks like Facebook and Twitter, with a subscription service via email or SMS alerts to mobile phones.

2.13 UNICEF

Presentation

The United Nations Children’s Fund (UNICEF) is an international organization aimed to aiding national efforts to improve the health, nutrition, education, and general welfare of children. UNICEF was built in order to care for children worldwide and work on resolving issues such as violence against children. UNICEF supports the idea that in order for a child to have a strong future, they need a quality beginning.

UNICEF promotes several issues that are a concern to the world today. They are strong supporters of girl’s receiving a primary education. They work towards immunizing children from common diseases and the prevention of the spread of HIV/AIDS. UNICEF also helps to form safe environments for children, which are free from abuse or exploitation.

UNICEF programs have been guided by the Convention on the Rights of the Child (1989), which affirms the right of all children to “the enjoyment of the highest attainable standard of health and to facilities for the treatment of illness and rehabilitation of health”.

Website: <http://www.unicef.org>

Information description and usage context

UNICEF measures the situation of children and women and tracks progress through data collection and analysis. It maintains and updates global databases and promotes dissemination of evidence-based data for planning and advocacy. This compilation of data is facilitated by the wide network of UNICEF field offices which submit updated information to Headquarters on an annual basis. These data are complemented by information obtained through the ongoing collaboration with other relevant UN organizations. Prior to inclusion in the UNICEF global databases, the data are rigorously evaluated against a set of objective criteria to ensure an evidence base of the highest quality.

UNICEF maintains the <http://www.childinfo.org> website as a source of up-to-date statistical information.

Databases presently available on this site include:



-
- Child Survival and Health
 - Child Nutrition
 - Maternal Health
 - Newborn Care
 - Water and Sanitation
 - Education
 - Child Protection
 - HIV/AIDS

Databases include economic and social data from 195 countries and territories, with particular reference to children's well-being. Users can choose their countries and indicators to build tables on the fly, or download the numbers into an Excel spreadsheet.

Furthermore UNICEF publishes several handbooks which provided practical tools for field staff to assess and meet the needs of children and women affected by disasters. Some examples are: Emergency Field Handbook¹ and Education in Emergencies².

2.14 UNDP

Presentation

The United Nations Development Programme (UNDP) was established in 1965 by the General Assembly of the United Nations to support national processes to accelerate the progress of human development. It aims at eradicating poverty through development, equitable and sustained economic growth, and capacity development. Ultimately, UNDP wants to achieve real improvements in people's lives and in the choices and opportunities open to them.

UNDP organizes its work along four focus areas:

- Reduce human poverty.
- Foster democratic governance.
- Support crisis prevention and recovery.
- Manage energy and environment for sustainable development.

Regarding the "Support crisis prevention and recovery" area, UNDP, through its global network, seeks out and shares innovative approaches to crisis prevention, early recovery and conflict resolution. And because UNDP is on the ground in almost every developing country,

¹ http://www.unicef.org/lac/manual_eme2005%281%29.pdf

² http://www.unicef.org/rosa/RosaEducation_in_Emergencies_ToolKit.pdf



wherever a crisis occurs, it is there to help bridge the gap between emergency relief and long-term development.

Website: <http://www.undp.org>

Usage example(s) of provided information

UNDP produces several periodical reports, guides and publications which showcases how results are delivered through programs on poverty reduction, democratic governance, crisis prevention and recovery, the environment and sustainable development and furthermore describe the expertise that UNDP has gained over the years. Concerning to the crisis prevention and recovery, examples of recent published reports are: UNDP Results: Crisis prevention and recovery (2014), Guide on Livelihoods and Economic Recovery in Crisis Situations (2013), Post-disaster recovery and resilience in typhoon-affected areas in the Philippines (2013) etc.

The Global Human Development Reports, published annually since 1990, are commissioned by UNDP. The reports focus on a highly topical theme in the current development debate, providing new measurement tools, innovative analysis and often controversial policy recommendations. The reports are written by independent teams of experts. The Global Human Development Reports contain substantive data on development indicators. Since the first report in 1990, four composite indices for human development have been developed – the Human Development Index, the Gender related Development Index, the Gender Empowerment Measure, and the Human Poverty Index. The Human Development Index (HDI) is a summary measure of human development. It measures the average achievements in a country in three basic dimensions of human development:

- A long and healthy life, as measured by life expectancy at birth;
- Knowledge, as measured by the adult literacy rate (with two-thirds weight) and the combined primary, secondary and tertiary gross enrolment ratio (with one-third weight);
- A decent standard of living, as measured by Gross Domestic Product (GDP) per capita.

UNDP ensures access to the HDI data through two mechanisms:

- Public Data Explorer³: it is a tool powered by Google which allows displaying Human Development Indicators as line graphs, bar graphs, cross sectional plots or on maps.
- Human Development Data API⁴ all of the data for the Human Development Report resides in 14 statistical tables on data.undp.org. All data is accessible via API, and can

³ <http://hdr.undp.org/en/data-explorer>

⁴ <http://hdr.undp.org/en/data/api>



be queried to return the data in several formats including JSON, XML, and CSV. All communication with the API is done through HTTPS.

2.15 GIO EMS

Presentation

The GIO Emergency Management Service (GIO EMS) is the first Copernicus service to become operational. Copernicus (previously Global Monitoring for Environment and Security – short GMES) is an EU programme aimed at developing European information services based on satellite Earth Observation and in situ (non-space) data. GIO EMS started operations on April 1st, 2012.

The mapping component of the service (GIO EMS-Mapping) has a worldwide coverage and provides the above-mentioned actors (mainly Civil Protection Authorities and Humanitarian Aid Agencies) with maps based on satellite imagery. The service started operations on 1st April 2012.

The products generated by the service can be used as supplied (e.g. as digital or printed map outputs). They may also be combined with other data sources (e.g. as digital feature sets in a geographic information system) to support geospatial analysis and decision making processes of emergency managers.

It supports all phases of the emergency management cycle: preparedness, prevention, disaster risk reduction, emergency response and recovery. The service is provided free of charge and can be activated by authorised users such as national civil protection authorities.

The GIO Emergency Management Service addresses a wide range of emergency situations resulting from natural or man-made disasters. It covers in particular:

- Floods
- Earthquakes
- Landslides
- Severe Storms
- Fires
- Technological disasters
- Volcanic eruptions
- Humanitarian crises
- Tsunamis

The service can be provided in:

- “Rush” mode, for emergency management activities that require immediate response. This is available on a 24/7 basis and products are provided as soon as possible (from a few hours to a few days after the user request)



- “Non-rush” mode, to support activities that do not require immediate response, i.e. for prevention, preparedness, disaster risk reduction and recovery phases.

Website: <http://emergency.copernicus.eu>

Usage example(s) of provided information

This service consists of the on-demand and fast provision (hours-days) of geospatial information. This information supports emergency management activities immediately following an emergency event. The service is based on the acquisition, processing and analysis, in rush-mode, of satellite imagery and other geospatial raster and vector data sources.

The products are standardised following a set of parameters the user can choose when requesting the service.

Reference maps provide a quick updated knowledge on the territory and assets using data prior to the disaster. The content consists of selected topographic features on the affected area, in particular exposed assets and other available information that can assist the users in their specific crisis management tasks. A reference map is normally based on a pre-event image captured as close as possible prior to the event.

- Depending on user requirements and the size of the Area Of Interest, reference maps are provided as maps:
 - Scale 1:25,000 – 1:500,000.
 - Area approx. 200 – 100,000 km²
- Detail maps:
 - Scale 1:5,000 – 1:25,000.
 - Area approx. 10 – 200 km²

Typical key geospatial information included in the reference maps are:

- Hydrology (river, lakes, dams etc.).
- Transport (roads, railways, airfields etc.).
- Landcover and Physiography (contours, cropland, natural vegetation etc.).
- Population-related info (toponyms, administrative boundaries, built-up areas etc.).

Delineation maps provide an assessment of the event extent (and of its evolution if requested). Delineation maps are derived from satellite post-disaster images. They vary depending on the disaster type and the delineation of the areas impacted by the disaster.

Examples: burnt area map, flooded area map, earthquake impact area map.

Grading maps provide an assessment of the damage grade (and of its evolution if requested). Grading maps are derived from post-event satellite images. Grading maps include the extent, magnitude or damage grades specific to each disaster type. They may



also provide relevant and up-to-date information that is specific to affected population and assets, e.g. settlements, transport networks, industry and utilities.

Examples: earthquake grading map with the count of the number of destroyed/damaged buildings in each cell of a regular grid. Population, roads, hospitals, shelters, gathering areas, etc. may be included.

All three different types of products may be delivered as an overview (the overall scene) and/or as a detail map (the most relevant area). By default, the product is provided with the output types and formats described in the following:

- Printable map
 - Full colour ISO A1, or equivalent
 - Resolution: high = 300dpi; medium = 200dpi; low = 100dpi
 - GeoPDF file format
 - Metadata file
- Georeferenced map
 - Full colour ISO A1, or equivalent
 - Resolution: high = 300dpi; medium = 200dpi; low = 100dpi
 - GeoTIFF, Georeferenced JPEG file format (with worldfile)file – can be the same as for the printable map
- Vector files of all the features derived from the analysis and interpretation stage
 - ESRI shapefiles with projection file (.prj)
 - Google Earth KML (or KMZ) format
- Metadata file



3 State Of The Art on Information Structures

The objective of the detailed state of the art is to capture from the different PDNA/RRP methodologies the available information, and how the information is organized, from general topics and sub topics (infrastructure, transport infrastructure etc.) to concrete indicators (number of bridges repaired). It can also be organized by geographic levels (country, region, village etc.), it can focus on different aspects (economic assessment of disaster effects, qualitative assessment based on population perception etc.) and it can be related to different situations (normal situation vs after crisis situation), different sources and different timing values (annually, monthly etc.) Sometimes information is structured, and sometimes information is unstructured (like textual information). Within the DESTRIERO platform, structured information can be exploited in an automatic treatment chain, and some can be shown to end-users through tables or enriched maps. Unstructured information can be shown to end-users through textual fields. Each methodology is presented according to its own information structure.

3.1 TRIAMS

Overview

- **Areas:** vital needs, basic social services, infrastructure, livelihoods.
- **Geographic levels:** country, district, sub-district
- **Phase** (risk reduction; relief; early recovery; recovery): recovery
- **Structured vs unstructured information:** n/a
- **Contribution to information management in humanitarian aid:** TRIAMS gives a complete information structure on a disaster impact, organized in 4 areas. It proposes indicators (and their precise definition) and details corresponding information sources (Ministries etc.).
- **Organizations supporting this model/methodology:** WHO (World Health Organization) + IFRC (International Federation of Red Cross and Red Crescent Societies)
- **Referent website or document:**
http://www.who.int/hac/crises/international/asia_tsunami/triams/en/, [UNWHO06]
- **Objective and creation context:** 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.



Description of the information structure

Information is organized in the following areas: vital needs, basic social services, infrastructure, livelihoods, and cross-cutting-issues. We present below the information associated to India and Indonesia, for each area. We can observe that a part of information is structured (number of deaths, missing, injured etc.), but frequently information is unstructured, with textual comments giving details (e.g. on permanent housing: “160,926 houses to be rebuilt” for India, “32,200 houses rebuilt” for Indonesia, “2,879 to be reconstructed 5,215 to be repaired” for Maldives, “1/3 of damaged houses rebuilt” for Sri Lanka).

On each topic, a first table shows the Tsunami impact (blue) and a second table shows the indicators used to obtain this impact assessment (red).

Vital needs

Table 1: Tsunami impact on vital needs for India and Indonesia

	India	Indonesia
Population affected	2.792 m	50% of the population of Aceh province
Deaths	12,405 (75% women and children)	130,000
Missing	5,640	37,000
Death + missing	18,045	167,000
Displaced	647,599	500,000
Injured	6,136	75,223
Orphaned	480	3,882
Widowed	787	-
Water supply damaged/destroyed	Yes	Over 10,000 water sources destroyed
Housing units destroyed/damaged	235,000	70,000 destroyed, 57,000 damaged Rp, 276.4 bn
Estimated value of damaged housing	-	Rp 13.004 bn
Water/sanitation infrastructure	Repaired 3,500 teachers trained in safe water/sanitation	Water systems repaired
Food delivered	-	-
Temporary houses – shelters or IDP camps	930 IDP camps besides 93,171 temporary shelters for 400,000 people	452,000
Permanent housing	160,926 houses to be rebuilt	32,200 houses rebuilt
Land rights/titles	-	12,000 land rights cases resolved, 500,000 to be resolved



Table 2: Selected indicators of recovery for basic social services

Recovery output indicators	<ul style="list-style-type: none">- % of population with access to water from an improved source, by administrative level- % of population without basic sanitation facilities, by administrative level- Household food consumption (24h recall)- Proportion of tsunami-affected population with housing damaged/destroyed living in emergency shelter/temporary houses/permanent houses, by sub-district, by time period- Measles immunization coverage, by administrative level- # of titles to land issued, by economic status and by gender, by district
Recovery outcome indicators	<ul style="list-style-type: none">- % of children under 5 who are underweight- % of children under 5 who are wasted (moderate and severe)- % of children under 5 who are stunted (moderate and severe)- % of low birth weight newborns- % of children under 5 who have experienced a diarrhoea episode within the past 2 weeks

Details information is also given on maps (Figure 1), and on specific figures showing simultaneously the numbers and the percentages (Figure 2).

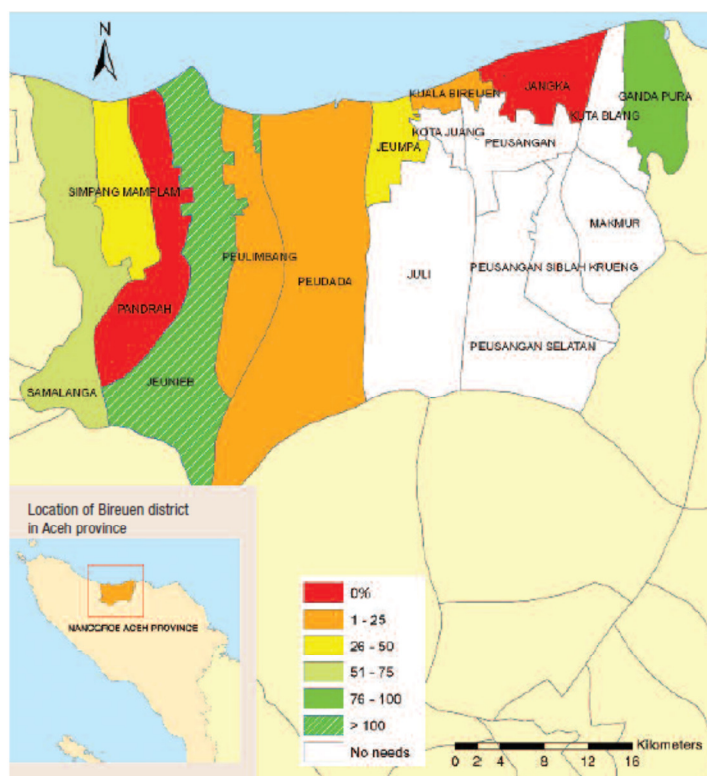


Figure 1: Percentage of houses built or under construction, by total housing needs, by sub-district in Bireuen district (Aceh province, Indonesia)

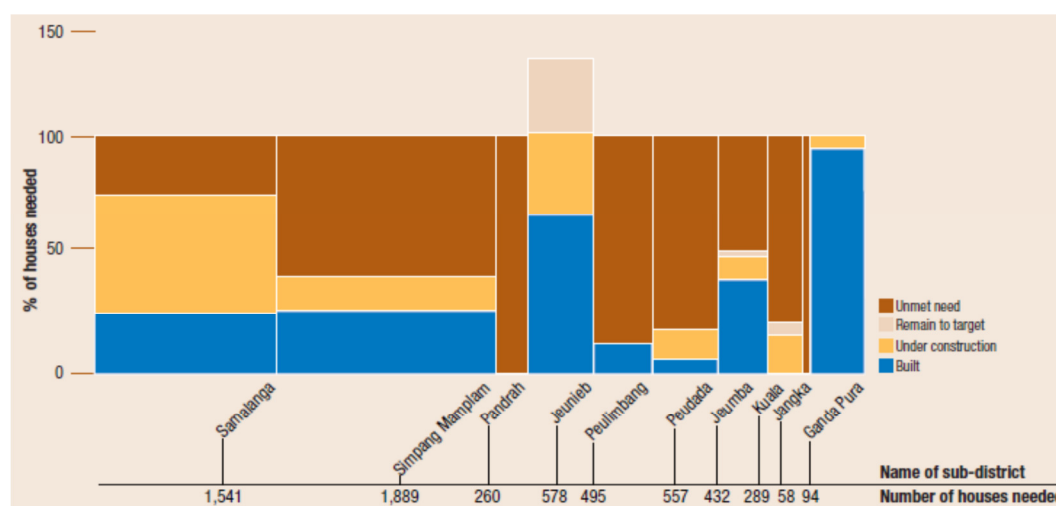


Figure 2: Housing reconstruction in Bireuen district, by tsunami affected sub-district (Aceh province, Indonesia)



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Basic social services

Table 3: Tsunami impact on basic social services in India and Indonesia

	India	Indonesia
Teachers killed	-	2,500
Schools damaged/destroyed	-	2,065 (Rp 1.030 bn)
Schoolchildren affected	-	165,000
Health facilities damaged/destroyed	80	Total: 592 41 out of 51 regional health facilities with reproductive health services damaged
Health personnel killed	-	High proportion of female health workers killed; 30% of midwives reported dead or missing
Estimated value of damage	-	Rp 15.578 bn
Health infrastructure repaired/new	Reconstructed	132 health centres (temporary and permanent) rebuilt
Medical equipment	Surgical and medical kits provided	Midwifery kits provided for 3,400 midwives, malaria testing kits and bed nets provided
Health personnel training	1,543 health and community workers trained in IMCI	46,096 health and community workers trained
Immunization campaigns	Yes	National immunization carried out weekly
School construction	Yes	Yes. 40 kindergarten, 113 elementary schools, 12 junior high schools, 18 senior high schools, 2 universities repaired/rebuilt
Teacher training	-	Yes. 2,340 teachers
Education kits	70,000 children benefited	129,202 schoolbooks delivered



Table 4: Selected indicators of recovery for basic social services in TRIAMS

Recovery output indicators	<ul style="list-style-type: none"> - # of primary school children per school, by sub-district - # of primary school children per teacher, by sub-district - # of hospital beds per 10,000 population (inpatient & maternity), by sub-district/district - # of outpatient consultations per person per year, by administrative level - % of children of 12–23 months who are fully immunized against all antigens, by administrative level - # of health facilities with emergency obstetric care per 10,000 population, by sub-district/district - adequate antenatal coverage (at least 4 visits during a pregnancy), by sub-district - % of sub-districts covered by mobile psychological support workers, by district
Recovery outcome indicators	<ul style="list-style-type: none"> - Net primary school enrolment ratio - Primary school drop-out rate - % of births attended by a skilled birth attendant

Infrastructure

Table 5: Tsunami impact on infrastructures for India and Indonesia

	India	Indonesia
Roads damaged	Extensive damage	3,000 km Rp 1.576 bn
Bridges damaged/destroyed	-	Total: 2,676 bridges (1) and 1,500 minor bridges
Airports damaged/destroyed	-	8 airports damaged Rp 17 bn
Vehicles damaged/destroyed	-	30,000
Infrastructure damaged/destroyed	-	
Electricity supply damaged/destroyed	-	Rp 15.578 bn
Roads repaired	Under way	490 km
School infrastructure	Reconstructed	524 being built
Power infrastructure repaired		82% repaired
Harbours/ports repaired/reconstructed	Under way	5 under way



Table 6: Selected indicators of recovery for Infrastructures

Recovery output indicators	<ul style="list-style-type: none"> - # of km of repaired/new road, by type of road, by district - # of bridges repaired, by district - # of harbours/jetties rehabilitated by type, by district - % of destroyed/damaged schools rebuilt or rehabilitated by category, by sub-district - % of destroyed/damaged health facilities rebuilt or rehabilitated, by category, by sub-district - # of sq. km of natural habitat restored, by type - # of km of coastal protection by type (biofencing, seawalls, quay walls, breakwaters) constructed/repared, by district
Recovery outcome indicators	<ul style="list-style-type: none"> - % of local administration offices fully functioning, by district

Livelihoods

Table 7: Tsunami impact on livelihoods in India and Indonesia

	India	Indonesia
Unemployment caused by the tsunami	-	In Aceh province, 600,000 people (25% of the population) lost their sole source of livelihood
Livestock perished	31,755	Livestock worth Rp 126 billion lost
Overall estimated economic loss	US\$ 435m	US\$ 394.4m in the productive sector
Total estimated cost of damage	US\$ 2.56bn	US\$ 4.5bn
Impact on GDP	Deficit doubled to 25%	97% of Aceh's GDP affected
Crop area damaged	39,000 ha	Rp 13.095 bn (5,000–7,500 ha)
Fishery sector damaged/destroyed	83,788 boats to be replaced	4,717 boats lost
Jetties and harbours damaged/destroyed	Main ports damaged	14 seaports damaged
Tourist infrastructure damaged/destroyed	-	-
Relief funds	Financial assistance provided	120,000 benefited
Land use plans	-	128 ha
Desalination	Yes	Yes
Skills training	Yes	Yes



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	India	Indonesia
Fisheries	Rebuilt	6,580 ha of fish ponds rehabilitated
Livestock (cattle, poultry, other) replaced	Yes	Yes
Crops	Cropping patterns changed	Seed distributed. 589,053 kg seeds and fertilizer distributed
Regained source of income	-	-

Table 8: Selected indicators of recovery for livelihoods

Recovery output indicators	<ul style="list-style-type: none"> - # of sq km of land returned to crops, by district - % of tsunami-affected population who have received loans, by administrative level, by gender - % of tsunami-affected population enrolled in social protection programmes, by gender, by sub-district - # of people employed, by different sector, by district, by gender - % of damaged/destroyed boats repaired/replaced, by use (fishing, tourism, ferrying and other income generating activities) and by district
Recovery outcome indicators	<ul style="list-style-type: none"> - % of population living below national poverty line - Average household income, by administrative level and by gender - Labour force participation rate, by gender - % of households that have regained their pre-tsunami livelihoods, by gender, by district

Cross-cutting-issues

Table 9: Additional data related to tsunami response

	India	Indonesia
Environmental restoration	Coastal protection repaired, biofencing installed	Coastal and forest protection repaired, biofencing installed, mangroves planted
Waste disposal	Waste-management system created for 140 villages	7–10 m m3 disposed of/treated
Tourists repatriated	-	-
People evacuated	647,599	420,926
People rescued	28,734	-
Legislative changes	-	-
Recovery of lost documentation	-	Document recovery



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	India	Indonesia
Institutional changes	Yes	Yes
Local authorities' capacities enhanced	-	Yes
Public awareness and education	-	Yes
Disaster early warning systems in place	Under way	Yes, in progress
National emergency/ response plans devised	-	Yes

Table 10: Outcome indicators not linked to a specific area of recovery.

- % of population with worse functioning (WHODAS II)
- Infant mortality rate
- % of population with poor quality of life
- % of tsunami-affected communities consulted by implementing agencies, by district

Additional indicators, specific to each country, are also proposed for each area, like “# of tonnes of tsunami waste recycled/removed”.

Information sources and update frequency

For each country, tables provide the name of information sources that provides the values on each indicator, and their update frequency. Here is an example of sources and timing for a subset of indicators, for India. As in other tables, some values are not specified.

Table 11: Indicators and their sources

Area of recovery	Indicators	Source	Timing
Vital needs	1/ % of population with access to water from an improved source, by administrative level	Department of Water Supply (sub-district) *Indicator renamed	Routine/ annually
	2/ % of population without basic sanitation facilities, by administrative level	Household survey, Department of Water Supply/Rural Development	Annually
Basic services	13/ # of primary school children per teacher, by sub-district	Department of Education (for primary schools)	Annually
	14/ # of hospital beds per 10,000 population (inpatient and maternity), by sub-district/district	Private, public/Ministry of Health Survey	Routine/ annually
Infra-structures	23/ # of km of repaired/new road by type of road, by district	Ministry of Surface Transport	Annually
Livelihoods	32/ % of tsunami-affected		



population who have received
loans

3.2 COD

Overview

- **Areas:** Boundaries, populated places, transportation infrastructure, hydrology, cities, marine, terrain, satellite imagery
- **Geographic levels:** Country, district, city
- **Phase** (risk reduction; relief; early recovery; recovery): Risk reduction
- **Structured vs unstructured information:** Structured information (e.g. political boundaries) and unstructured information (e.g. information about hazards)
- **Contribution to information management in humanitarian aid:** Provides minimum operational datasets with geospatial information for a disaster area in a standardized format
- **Organizations supporting this model/methodology:** UNOCHA
- **Referent website or document:**
<https://www.humanitarianresponse.info/applications/data>
- **Relevant document(s) describing the model/methodology:** [OCHA07], [AminGold08]
- **Objective and creation context:** “The purpose of this instruction is to establish the overarching policy for the effective utilization and coordination of Geographic Information Systems (GIS) and geospatial data within OCHA. The main objective of this policy is to improve the accessibility of a wide variety of geospatial data, together with the associated information, at different scale and from multidisciplinary sources, organized and documented in a standard and consistent way within the organization.” [OCHA07] “Over the past two years, these global lead organizations have worked with other large-scale organizations with expertise in a given sector as follows: [...] (b) to agree on operational standards and other tools and guidelines for the sector [...] to ensure that international humanitarian assistance in a given sector is appropriate, relevant, well-coordinated, and of uniformly high standards.” [AminGold08: p. 62]

Description of the information structure

UNOCHA defined two categories for common operational datasets: the minimum CODs and the optional CODs. Both contain geospatial information for different information categories in well-defined data layers and recommended scales. The following table gives an overview [AminGold08: p. 75].



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Figure 3: Minimum and Optional Common Operational Data Sets (COD)

Category	Data layer	Recommended scale of source material
Political, administrative boundaries	country boundaries administrative level 1 administrative level 2 administrative level 3 administrative level 4	1 : 250,000
Populated places, including latitude and longitude, alternative names, population figures, classification	settlements	1 : 100,000– 1 : 250,000
Transportation network	roads, railways	1 : 250,000
Transportation infrastructure	airports, helipads, seaports	1 : 250,000
Hydrology	rivers, lakes	1 : 250,000
City maps	computer-scanned city maps	1 : 10,000
Marine	coastlines	1 : 250,000
Terrain	elevation	1 : 250,000
National map series	scanned toposheets	1 : 50,000– 1 : 250,000
Satellite imagery	Landsat, ASTER, Ikonos, Quickbird imagery	various
Natural hazards ^a	various	various
Thematic	various	various



3.3 DaLA

Overview

- **Areas:** damages, flows of the economy, post disaster macroeconomic performance
- **Geographic levels:** country, district, sub-district
- **Phase** (risk reduction; relief; early recovery; recovery): recovery
- **Structured vs unstructured information:** structured and unstructured information
- **Contribution to information management in humanitarian aid:**
 - DaLA provides damage as the replacement value of totally or partially destroyed physical assets, losses in the flows of the economy that arise from the temporary absence of the damaged assets; and, finally the resultant impact on post-disaster macroeconomic performance, with special reference to economic growth/GDP, the balance of payments and fiscal situation of the Government.
 - Post-Disaster Needs Assessment (PDNA) is a synthesis of DaLA and human recovery needs assessment. It typically includes the recovery and reconstruction framework that guides the post-disaster recovery strategy. A unique aspect of the PDNA is that it is led and owned by the government of the affected country and assisted by a multi-disciplinary, multi-agency team comprising the World Bank, GFDRR, UN Agencies, European Commission, and other relevant stakeholders.
- **Manuals and Guidelines:** ECLAC Handbook
- **Organizations supporting this model/methodology:** Global Facility for Disaster Reduction and Recovery (GFDRR)
- **Referent website or document:** <https://www.gfdr.org/fr/node/69> and <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTURBANDEVELOPMENT/EXTDISMGMT/0,,contentMDK:20196047~menuPK:1415429~pagePK:210058~piPK:210062~theSitePK:341015,00.html>
- **Relevant document(s) describing the model/methodology:** [ECLAC03]
- **Objective and creation context:**
 - The Post-Disaster Needs Assessments (PDNAs) conducted under the leadership of affected country governments are the most important tasks of the Standby Recovery Financing Facility (SRFF). The flagship products of SRFF are the reports that these assessments generate. These are reports of the respective governments prepared with the assistance of GFDRR and the international community at large. They are increasingly being used by governments and the international development community to base the recovery and reconstruction plans and programs upon. They are also as the base document for discussions to determine international development assistance in cases requiring external assistance including leveraging of



targeted or additional assistance from the World Bank and other traditional donors.

- Utilizing the Damage and Loss Assessment (DaLA) methodology (after receiving training from the World Bank team), the various government departments involved are able to aggregate key data and understand the full impact of the disaster in terms of both damages (impact on physical infrastructure) and losses (economic impact).

Description of the information structure

Data gathering and analysis of disaster impact are usually conducted for the following overarching sectors:

- Infrastructure – transport/roads, electricity, water supply and sanitation, and fire, police, and aviation;
- Productive – agriculture and agro-industries;
- Social – housing, health, and education; and
- Cross-cutting – environment, gender, and disaster risk management.

An analysis of the macroeconomic impact of the event has to be carried out as well. We are going to present reported information associated to Seychelles damages due to heavy rains resulting from tropical cyclone Felleng caused severe flooding and landslides. We can observe that a part of information is structured (number of deaths, missing, injured etc.), but frequently information is unstructured, with textual comments giving details.

Summary Reports

The information has been reported both in structured and unstructured format, reporting some pictures that reports textual detailed information, but also providing tables with disaster effects.

Figure 4: Example of DaLA summary reports figures

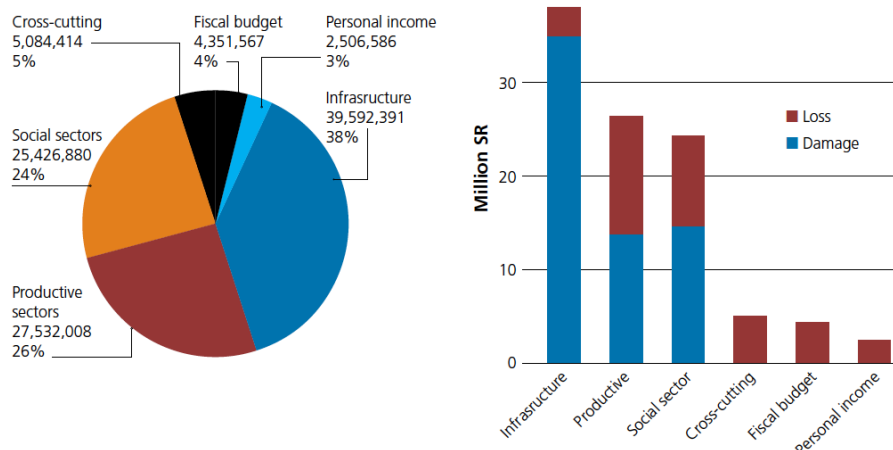




Table 12: Example of a DaLA summary report table

Subsector, component	Disaster effects (SR)			Disaster effects (US\$)		
	Damage	Losses	Total	Damage	Losses	Total
Social sectors	15,231,910	10,194,970	25,426,880	1,218,553	815,598	2,034,150
Housing	12,186,910	2,534,970	14,721,880	974,953	202,798	1,177,750
Education	2,545,000	660,000	3,205,000	203,600	52,800	256,400
Health	500,000	7,000,000	7,500,000	40,000	560,000	600,000
Productive sectors	14,152,541	13,379,467	27,532,008	1,132,203	1,070,357	2,202,561
Agriculture	9,706,788	8,129,467	17,836,255	776,543	650,357	1,426,900
Industry	4,445,753	—	4,445,753	355,660	—	355,660
Land use	—	5,250,000	5,250,000	—	420,000	420,000
Tourism	—	—	—	—	—	—
Infrastructure	36,217,940	3,374,451	39,592,391	2,897,435	267,076	3,167,391
Transport/roads	34,600,000	2,050,000	36,650,000	2,768,000	164,000	2,932,000
Aviation	20,000	—	20,000	1,600	—	1,600
Electricity	25,000	200,000	225,000	2,000	16,000	18,000
Water supply/sewerage/sanitation	985,000	750,000	1,735,000	78,800	60,000	138,800
Police Department	156,300	—	156,300	12,504	—	12,504
People's Defense Forces (SPDF—Army)	—	36,000	36,000	—	—	—
Fire Rescue Services Agency (SFRSA)	431,640	338,451	770,091	34,531	27,076	61,607
Cross-cutting sectors	—	5,084,414	5,084,414	—	406,753	406,753
Disaster risk management	—	620,139	620,139	—	49,611	49,611
Environment	—	4,464,275	4,464,275	—	357,142	357,142
Personal Income loss	—	2,506,586	2,506,586	—	200,527	200,527
Due to disease	—	2,410,515	2,410,515	—	192,841	192,841
Cottage business	—	96,071	96,071	—	7,686	7,686
Fiscal budget	—	4,351,567	4,351,567	—	348,125	348,125
Agency for Social Protection (ASP)	—	3,271,567	3,271,567	—	261,725	261,725
Ministry of Land and Housing	—	480,000	480,000	—	38,400	38,400
District administration	—	600,000	600,000	—	48,000	48,000
TOTAL	65,602,391	38,409,888	104,493,846	5,248,191	3,108,436	8,359,508

Recovery and Reconstruction Priorities

Once analysed each sector damage assessment, the DaLA has to describe also a possible priority for recovery and reconstruction to be assigned on each one, priority that usually is described in non-structured format, based on specific needs, defining Short-Term, Medium and Long Term Actions. A part of short-term actions has been reported below.



Figure 5: Example of short-term actions.

Short-Term Actions (1 year)

- Repair and clean up the damaged houses and infrastructure, including roads, drainages, schools, police station, and recover agriculture production
- Conduct a workshop to assess the effectiveness, efficiency, strengths, and weaknesses of the January flood response system with all the stakeholders and make improvements for the national response mechanism
- Conduct a vulnerability assessment of existing infrastructure, such as bridges, roads, channels, and solid waste management plants
- To reduce risk of flooding,
 - Develop or update the drainage master plan for each district for flood-prone areas
 - Ensure the effectiveness of operation and maintenance of drainage network, as well as efficient coordination between agencies
- Develop national multirisk mapping, including flood, landslide, rockslide, mudslide
- Develop a community emergency response plan, contingency, and evacuation toolkits, including

Sectors Analysis

For each sector, an overview is provided, reporting also a description of impact of disaster and possible recovery initiatives. More, it's proposed a recovery plan to be applied both in short and long term recovery, always provided in non-structured format. Detailed information is defined for financing needs on recovery and reconstructions, as for analyzed damages: in the next tables, example of water and Sewerage Sector Damages and Roads Recovery needs are reported.



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Table 13: Example of DaLA sector analysis tables

Sector	Damages or losses	Description	Cost (SR)
Water supply	Damage	Distribution pipes; 96 recorded burst in the flooded areas on January 27 and 28	125,000
	Losses	Man hours (overtime) for continuous unblocking of intakes, flushing of lines, backwashing of filters, and pipe repairs. Fuel, transportation, equipment (pipe fittings), and increased chemical usage at treatment plants.	350,000
	Total		475,000
Sewerage/Sanitation Systems			
Pointe Larue	Damage	Damaged collection pipes due to blockages by debris, manhole damages, and equipment failure at the treatment plant.	310,000
	Losses	Man hours (overtime) for unblocking and repair of sewer pipes and equipment at treatment plant. Fuel, transportation, pipe fittings, and pumping activities.	200,000
	Total		510,000
Anse Aux Pins	Damage	Damage to sea outfall pump and accessories, rotating biological disc, and auxiliaries.	550,000
	Losses	Man hours (overtime) for repair of pumps and accessories at the treatment plant. Fuel, transportation, electrical fittings, and pumping activities.	200,000
	Total		750,000
TOTAL (SR)	Damage		985,000
	Losses		785,000

Table 14: Example of DaLA recovery and reconstruction needs

Needs for recovery and reconstruction (transport/road sector)	Financing needs (SR)	Financing available (SR)	Financing gap (SR)	Timeframe
Recovery	48,600,000	0	48,600,000	
Short term	32,600,000	0	32,600,000	
Resurfacing of damaged roads	16,000,000	0	16,000,000	6 to 18 months
Construction of retaining walls	12,000,000	0	12,000,000	1 year
Rehabilitation of damaged bridges and culverts	2,600,000	0	2,600,000	6 months
Construction of emergency drain channels	2,000,000	0	2,000,000	6 months
Medium to long term	16,000,000	0	16,000,000	
Resurfacing of damaged roads	16,000,000	0	16,000,000	18–36 months
Reconstruction	42,900,000	0	42,900,000	
Short term	900,000	0	900,000	
Drainage study	500,000	0	500,000	6 months
Study of the culverts, bridges, roads	400,000	0	400,000	6 months
Medium to long term	42,000,000	0	42,000,000	
Procurement of adequate road maintenance equipment	30,000,000	0	30,000,000	1–2 years
Construction of retaining walls	12,000,000	0	12,000,000	1–3 years
TOTAL	91,500,000	0	91,500,000	1–3 year

Source: SLTA, 2013.



Macroeconomic Impact

In this section an analysis is performed on local country economic impact of disaster due to recovery needs and costs. The reported information is both non structured and structured and detailed in tables as next one for “Estimation of Income Loss Due to Disease”.

Table 15: Example of DaLA macroeconomic impacts

Disease	Number of patients	Average sick leave	Average salary (SR/month)	Losses	
				Total in SR	Total in US\$
Dengue	74	1 week	6,987	129,260	10,341
Hand, foot, and mouth (HFMD)	1019	1 week	6,987	1,779,938	142,395
Diarrheal	287	1 week	6,987	501,317	40,105
Total				2,410,515	192,841

Other Information

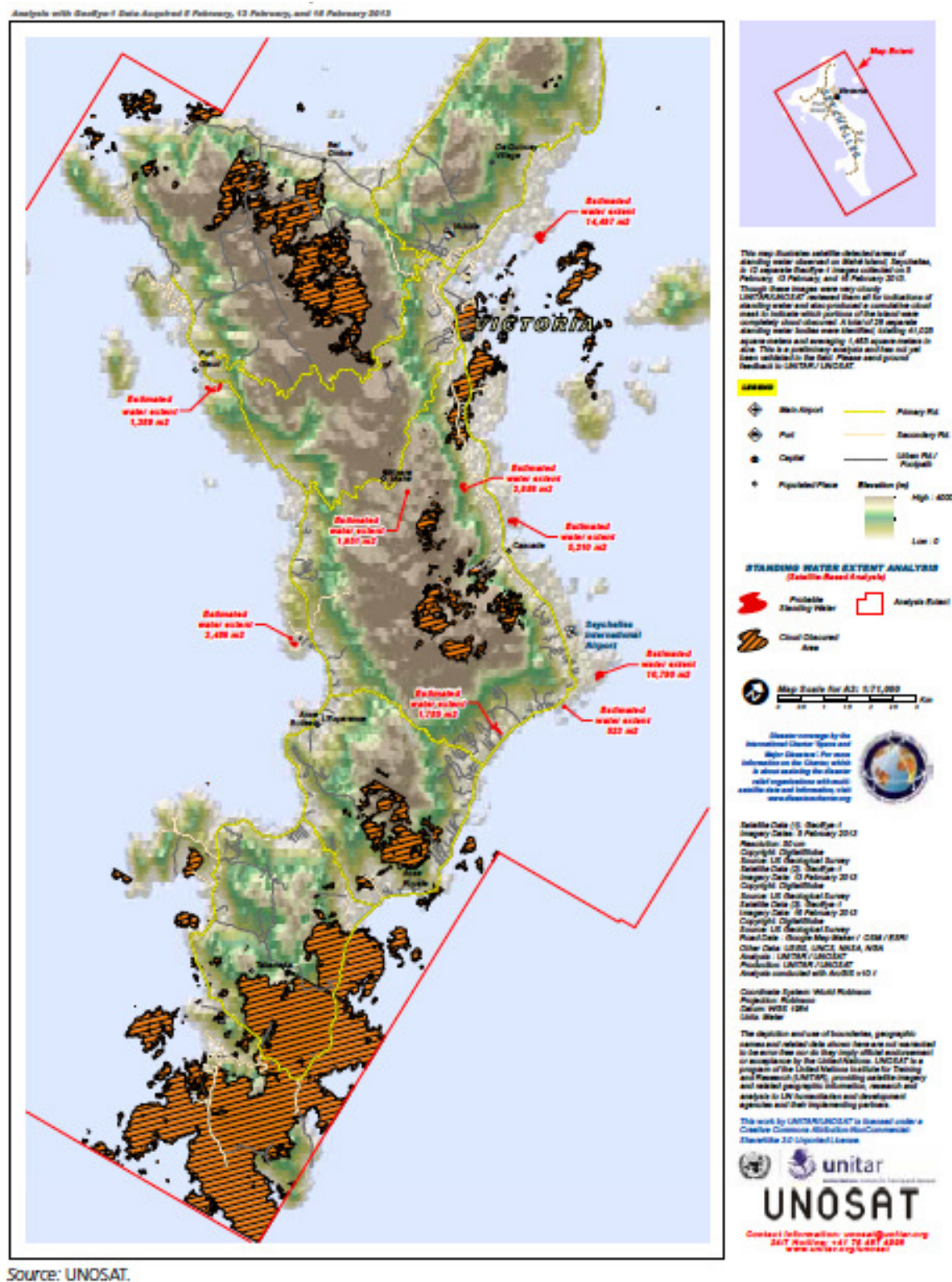
As the methodology has not specific constraints on Assessment content, the reports usually contains also extra useful information that could be considered as not structured information of interest, as Satellite Maps view of affected areas, or information about DaLA participants contacts.



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Figure 6: DaLA satellite map view





3.4 CDAAAM

Overview

- **Areas:** Description of the situation, Estimates of effects, External Assistance Needs, Transportation Means, Severity of Disaster, Actions taken locally, Local Coping Capabilities and Resources, Immediate Priorities for External Relief, Logistics for Delivering Relief, Possible Forecasts of future Developments (problems, changes, vulnerable groups and special concerns), Rehabilitation and Reconstruction needs
- **Geographic levels:** Country, Region
- **Phase** (risk reduction; relief; early recovery; recovery): n/a
- **Structured vs unstructured information:** Structured (information is in the form of reports)
- **Contribution to information management in humanitarian aid:**
 - Disaster response planning and decision making requires a series of assessments and report writing to be conducted in phases. This details four types of suggested assessment reports that should be carried out in four different phases, which are included to facilitate the post-disaster assessment process.
- **Organizations supporting this model/methodology:** All India Disaster Mitigation Institute (AIDMI), EU
- **Referent website or document:** <http://www.ifrc.org/>, [AIDMI05]
- **Objective and creation context:** The All India Disaster Mitigation Institute is a community-based action research and action-planning organization that aims to bridge the gaps between policy, practice and research from the local community level to the national level. Established after the 1987-89 droughts in Gujarat, AIDMI primarily focuses on four securities programmed that address the basic human requirements of work, food, water and shelter. Initially conceived as a small project, AIDMI became a fully autonomous organization in 1995, active from project to policy and grassroots to advocacy level.

Description of the information structure

To provide continuous support to the disaster-affected community, AIDMI's activities are separated into eleven different activity centres. These are: Action Review and Research Services, Bhuj Reconstruction Programme, Building Peace and Protection, AIDMI-AMA Joint Centre for Disaster Risk Management, Emergency Food Security Network, Emergency Health Unit, Learning Resources, Livelihood Relief Fund, Organisational Resources, Sphere Resource Centre, and Water Security Programme. Each activity centre focuses on specific issues for disaster mitigation and reduces future risks.



Flash Report

The flash report should be prepared and submitted immediately (within 1-3 hours) when a hazard strikes. Its purpose is to simply confirm that the disaster has actually occurred and that steps are being taken to cope with it. It should also indicate the type of damage and the required external assistance. If possible, it should priorities the external assistance required.

Table 16: Suggested format for a flash report

Part 1	Situation	Specific Information	
1.1	Type of disaster		
1.2	Date and time		
1.3	Affected area		
1.4	Possibility of after effects		
Part 2	Initial Estimate of Effects	Very Approximate Numbers	Source of Information
2.1	Dead		
2.2	Injured		
2.3	Missing		
2.4	In need of food		
2.5	In need of water		
2.6	In need of shelter and clothing		
2.7	Damage to lifeline systems		
2.8	Damage to livelihood activities		
2.9	In need of sanitation		
Part 3	Possible Needs for External Assistance	Circle	Priorities
3.1	Search and rescue	Yes/ No	
3.2	Evacuation	Yes/ No	
3.3	Protection	Yes/ No	
3.4	Medical and health	Yes/ No	
3.5	Shelter and clothing	Yes/ No	
3.6	Food	Yes/ No	
3.7	Water	Yes/ No	
3.8	Sanitation	Yes/ No	
3.9	Repair of lifeline system	Yes/ No	
Part 4	Transportation means	Specify	
4.1	What types of vehicles are available		
4.2	Which routes should be followed		
Part 5	Next Report	Specify	
5.1	Date/ time		
5.2	Will be Sent at 1. Preparation date/ time 2. Prepared by		

Initial Report

An Initial Report should follow the Flash Report as soon as possible. Its purpose is to report the severity of the disaster with more accurate information. More importantly, it should relate the severity of the disaster to local coping capacities. An initial report should carry important information that can assist agencies or practitioners in making decisions about



resource mobilisation and deployment of personnel to help affected victims. The report should therefore briefly summarise the following:

- The severity of the disaster (providing precise figures);
- Actions being taken locally;
- Local coping capacities (including locally available resources);
- The immediate priorities for external relief, where it is required and in approximately what quantities;
- Suggest the best logistical means of delivering relief, and
- Forecast possible future developments including new risks.

Table 17: Suggested format for an initial report

1. The affect

No.	Particulars	Please Specify
1.1	Type of disaster	
1.2	Date and time	
1.3	Affected area (approx)	
1.4	Number of dead (approx)	
1.5	Next report will be sent at (date/time)	

2. Search and Rescue

No.	Location (district, town, village)	Total No. of People Missing (approx)	Response Status (local S & R resources deployed)	Required Additional S&R Resources (S&R teams, ambulances, special expertise, heavy equipment etc.)	Priority
2.1					
2.2					
2.3					
Total					

3. Evaluation

No.	Location (District, town, village)	Total No. of people to be evacuated (Approx)	Response Status (No. of people being evacuated under local arrangements)	Required Additional Evacuation Assistance	Priority
3.1					
3.2					
3.3					
Total					

4. Protection (if applicable)

No.	Location (district, town, village)	Total No. of people needing protection	Response status (No. of people being protected under local arrangements)	Required additional resources for protection	Priority
4.1					
4.2					
4.3					
Total					



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5. Medical and Health

No.	Location (district, town, village)	Total No. of injured people (approx)	Response status (condition of medical facilities, hospital wards, casualty, equipment)	Required medical resources from external sources (ambulances, special expertise, equipment etc.)	Priority
5.1					
5.2					
5.3					
Total					

6. Shelter and Clothing

No.	Location (district, town, village)	Total No. of people requiring shelter or clothing (approx)	Response Status (number of people being provided with shelter or clothing under local arrangements)	Required additional assistance (specify type of assistance required e.g. tents, plastic sheeting, blankets, clothing)	Priority
6.1					
6.2					
6.3					
Total					

7. Food

No.	Location (district, town, village)	Total No. of people requiring food (approx)	Response status (number of people being protected with food under local arrangements)	Required additional resources for meeting food requirements (food grains, cooking fuel and equipment etc.)	Priority
7.1					
7.2					
7.3					
Total					



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8. Water

No.	Location (district, town, village)	Total No. of people without adequate clean usable/ drinking water (approx)	Response status (number of people supplied with safe usable/drinking water under local arrangements; condition of water supply system; availability of surface water required)	Required additional resources of sufficient, safe usable/drinking water (ask if treatment supplies, containers or trucks are needed)	Priority
8.1					
8.2					
8.3					
Total					

9. Sanitation

No.	Location (district, town, village)	Total No. of people without adequate sanitation (approx)	Response status (number of people being provided with adequate sanitation under local arrangements)	Required additional resources for sanitation facilities (ask if latrines, soap, detergents, chlorine powder, insecticides, sprayers etc. required)	Priority
9.1					
9.2					
9.3					
Total					

10. Lifeline Systems

No.	Location (district, town or village, or place to place)	Roads and Bridges	Railways	Power Supplies	Communi- cation Systems	Required external support (listsupplies and equipments requested from external sources)	Priority
10.1							
10.2							
10.3							
Total							

11. Livelihood

No.	Location (district, town, village)	Total No. of people demanding livelihood support (approx)	Response status (number of livelihood affected people being supported under local arrangements)	Required additional resources for livelihood restoration (tools and equipments etc.)	Priority
8.1					
8.2					
8.3					
Total					

SUGGESTED FORMAT FOR QUANTIFYING NEEDS

No.	Requirement/need	Appx. number Quantity of people	Area	Priorities



Interim Report

An interim report should build on earlier reports and provide additional and more precise information. To begin with, interim reports should be submitted every 24 hours. After some time, the emphasis of interim reports will shift from relief needs to rehabilitation and reconstruction needs (e.g. repairs to damaged structures, restoration of agriculture, animal husbandry, fisheries and industrial production). In interim reports, it is not necessary to repeat what has been written in previous reports unless the earlier details require updating. Interim reports should provide forecasts (with inputs from specialists and people who have experience of previous disasters) and highlight information which may not otherwise be obvious to the recipients.

For example:

- Potential problems;
- Changes, patterns, trends and indicators;
- Particulars of especially vulnerable groups, and any other special concerns.

Final Report

The final report would present a summary of what happened, how the response was managed and what lessons have been learned. "The format of the final report should be consistent with that of earlier reports".

3.5 MRAHA

Overview

- **Areas:** General situation of the population, Water, Health situation, Basic and Environmental Sanitation, Food and Nutrition, Geographic Situation, Protection, Shelters, Livelihood, Education, Organization and Coordination
- **Geographic levels:** Community, Municipality, Department, Country
- **Phase** (risk reduction; relief; early recovery; recovery): relief/early recovery/recovery (the methodology is applied immediately after the event, but can also be used in any moment of the disaster)
- **Structured vs unstructured information:** structured and unstructured information
- **Contribution to information management in humanitarian aid:** n/a
- **Organizations supporting this model/methodology:** REDLAC (OCHA, UNDP, BCPR, WFP, UNICEF, IFRC, ISDR, PAHO/WHO, PNUMA, OXFAM, CARE, Plan International)
- **Referent website or document:** <https://wca.humanitarianresponse.info/>, [REDLAC06]
- **Objective and creation context:** The Work Group for Risk, Emergencies and Disasters for the region's Interagency Standing Committee (REDLAC) was formed with the aim of creating a platform for the exchange of information, reflection and actions that optimize preparedness and response actions for preventing and mitigating suffering



of populations vulnerable to natural disasters is Latin America and the Caribbean. The group focuses its interventions during the response and preparedness stages and coordinates tasks of prevention and mitigation with other actors.

Description of the information structure

The methodology and tools make up an integrated instrument, which does not substitute those developed by members or organisations working in the area of disasters. It aims to provide shared information during an emergency for an interagency needs analysis, as well as facilitate an integrated understanding of the needs to better support the preparation or application and the establishment of humanitarian assistance interventions in cases where these exceed national capacity (inter-agency appeals).

To obtain the information required, the methodology has designed four instruments:

- Criteria for rapid assessments.
- Questionnaire guide.
- Short check list.
- Rapid assessment form.

These four instruments represent tools that have the same objective and structure (indicators) for collecting information but have different forms of presenting data. They are applied with a map of indicators which determines the same structure of variables, only modifying the manner of searching the information. In the following, the structure of indicators is described.

Table 18: List of Indicators

General Situation of the Population	Population Structure of the population Characteristics of the population
Water	Supply before the disaster Affection of water supply Proportion of dwellings and shelters without water State of water sources Alternatives sources of water
Health Situation	Health Personnel Health of the people Causes for medical attention Disposal of corpses Availability of medicines, supplies and others Health centres
Basic and Environmental Sanitation	Functioning of sanitation systems Systems of waste disposal Levels of contamination Risk of disease from vectors
Food and Nutrition	Calculation of losses Affection of sources of income and food



	Food consumption Means of preparing food Food reserves Interventions
Geographic Situation	General Topography Main rivers Climate Access Availability of services Special conditions
Protection	Situation of children orphaned and separated Mistreatment, rape and sexual abuse Psychosocial support Protection of rights Barriers for the compliance of rights Signs of discrimination
Shelters	Type of shelters and their needs Demand for shelters Basic services in shelters Number of persons in shelters Shelter capacity Access to shelters Types of shelters - permanent or temporary Conditions of risk for shelter
Livelihood	Economic activity affected Rise in prices Strategy of recovery and terms Areas with greater vulnerability Organization for recovery Type of affectation to dwellings Possibility of recovery of land for dwellings Land ownership
Organization and Coordination	Organization responsible per theme Coordination mechanisms Flow of information
Education	Affected schools Number of students affected Loss of furniture and didactic material

General situation of the population: The population and its distribution, before and after the disaster, are fundamental elements in determining the magnitudes of the event and the amount of humanitarian assistance required. As such, its characteristics offer indicators to focus the strategies and priority actions.

Indicators



-
- Population
 - Total population of the country and by municipality
 - Number of people affected by the event
 - Number of displaced people
 - Number of families affected
 - Number of dead
 - Number of missing
 - Number of children younger than 5 affected by the disaster
 - Number of pregnant women affected by the disaster
 - Number of seniors affected by the disaster
 - Population structure
 - Proportion of population by gender
 - Proportion of handicapped or disabled people
 - Characteristics of the affected population
 - Proportion of urban or rural population
 - Dominant economic activity in the affected zone
 - Ethnic and cultural groups and special languages

Geographic situation of the disaster zone: Geographic information offers information on the characteristics of the humanitarian response strategy. It provides data on the topographic and climatic characteristics of the affected zone, accessibility, and security conditions. This information is also important for the logistics of humanitarian operations.

Indicators

- General
 - Affected area
 - Type of event
 - Level of historical reoccurrence of the event
 - Affected surface in square kilometres
- Topography: Mountainous, Flat, Low coastal
- Main rivers in the affected area
- Climate: Rainy, dry, hot or cold, strong winds.
- Accessibility: Determine the operability of the roads (in hours of travel and specifying the stretches), airports and ports of entry to the head of the municipality and the most appropriate routes to the affected zones.
 - Roads (starting from; and arriving at)
 - Land
 - Air
 - Fluvial (maritime/rivers)
- Availability of services of electric energy, communication and fuel: Determine if they are functioning and the reasons why the following services are not functioning.



-
- Electric energy
 - Telephone/fax
 - Cellular telephone
 - Radio
 - Television
 - Radio communication
 - Distribution of fuel
 - Special conditions
 - Political considerations
 - Social conflict
 - Problems with ethnic, religious, or cultural minorities
 - Movement (massive) of the population (to /from the affected area)
 - Special problems with security

Health situation

Indicators

- Health personnel
 - Number of doctors, nurses, technicians, services and others available, injured or dead.
- Health of the people per affected zone
 - Number of injured according to severity; severe and light
 - Need treatment for evacuation
 - Number of injured in health centres
 - Caring for ill persons in hospitals or in charge of relatives (men or women)
- Causes for attention per type of illness
 - Number of children under 5
 - Number of women and men over 5
 - Tendency for a possible increase in cases per type of illness
- Possible problems for the disposal of human and animal corpses.
- Availability of medicines, medical supplies and others
 - Type of provision of medicines and medical supplies; regular (normal) or extraordinary
 - Satisfaction of real needs for medicine and medical supplies
 - Number of ambulances available
- Health Centres
 - Name of health centres, laboratories and blood banks
 - Category of health centre
 - State of operation (partial or total)
 - Number of available beds
 - Availability of water and electric energy services



Food and nutrition

Indicators

- Calculate the loss of crops and animals
 - Number of plots seeded that are partial or totally lost and the level of recoverability
 - Estimation of the loss in proportion to the next harvest
 - Quantity of animals lost and number of families affected
 - Quantity of productive goods lost and number of families affected
- Affection of sources of income and food
 - Affection of the three main sources of income
 - Affection of sources of food: own production, purchase, donation, exchange, collection
- Food consumption
 - Normal, more or less consumption of food related to the period prior to the disaster of the affected families
- Facility for preparing food
 - Availability of; water, kitchens, fuel, and kitchen utensils for preparing food
- Food reserve
 - Affection of reserves, capacity for obtaining reserves and the estimated time of inaccessibility
- Assistance present
 - Organisations that provide assistance, distributed products, available inventory

Water

Indicators

- Water supply before the disaster
- Affection of the quality, quantity, or continuity of the provision of water
- Proportion of dwelling and shelters that do not have water
- State of sources of water in the zone compared with the situation prior to the disaster
- Alternative sources of water supplies (surface or subterranean)

Basic and environmental sanitation

Indicators

- Functionality of sanitation systems; latrines, sewer systems and septic tanks.
- Waste disposal systems; solid, discharge of grey/black water, and rubbish.
- Contamination levels
- Risk of diseases produced by vectors



Shelters

Indicators

- Type of shelters and their needs
- Demand for shelters
- Basic services in shelters
- Number of people in shelters (men, women and children under 5)
- Capacity of shelters
- Accessibility of shelter
- Temporary or permanent shelter
- Risk conditions of the shelter

Livelihood (early recovery)

Indicators

- Economic activity affected, predominantly male and female sectors and number of families
- Increase in prices of food, basic goods, land, and construction material
- Recovery strategies
- Length of terms of recovery strategies and their effect on reducing vulnerability
- Affected areas with greater vulnerability
- Organization surrounding the recovery
- Type of affectation to dwellings
- Possibility of recovering the zone
- Availability and ownership of the land for dwellings

Protection

Indicators

- Situation of children; orphans and separated from their family with identification and documents
- Mistreatment, rape and sexual abuse
- Monitoring the theme of protection
- Psychosocial support
- Protection of rights
- Main barriers to the compliance of basic principles and actions of protection
- Signs of discrimination

Organization and Coordination

Indicators

- Organisations responsible per theme at each level



-
- Coordination mechanisms
 - Flow of information

Education

Indicators

- Affection of schools
- Number of students
- Proportion of losses of furnishings and didactic material

3.6 MIRA

Overview

- **Areas:** Pre Disaster Situation and Post Disaster situation for the following areas: Geographical Affects, Groups affected (Total vs Sub groups), Livelihood, Vulnerability, Catchment Areas, Gender, Age Groups, Water and Sanitation, Health, Food Security.
- **Geographic levels:** Country, Region
- **Phase** (risk reduction; relief; early recovery; recovery): n/a
- **Structured vs Unstructured information:** structured information
- **Complete Name:** The Multi Cluster/Sector Initial Rapid Assessment (MIRA) Approach Process, Methodologies And Tools
- **Organizations supporting this model/methodology:** UN (OCHA), NGOs, International Red Cross, Red Crescent Movement.
- **Referent website or document:** <http://reliefweb.int/>, [RELIEF12]
- **Objective and creation context:** The MIRA is a multi-sector assessment carried out by key stakeholders during the first two weeks following a sudden-onset disaster. It aims to provide fundamental information on the needs of affected populations and the priorities for international support. The MIRA enables all humanitarian actors to reach, from the outset, a common understanding of the situation and its likely evolution and to agree on immediate strategies.

For several years the humanitarian community and donors have agreed that the absence of a coordinated approach to needs assessment among humanitarian actors has hindered evidence-based decision making and effective humanitarian response. While individual governments, UN Agencies and NGOs have developed various approaches to collecting and analysing data on humanitarian needs, little effort was dedicated to ensuring the synergies necessary for a robust and holistic identification of humanitarian priorities. In response, the Inter Agency Standing Committee (IASC) created the Needs Assessment Task Force (NATF) in 2009 to promote cross-sectoral needs assessment initiatives and the holistic, consistent, reliable and timely collection and analysis of data on humanitarian needs in complex emergencies and natural disasters. To address calls for the cross-sectoral identification of key strategic



humanitarian priorities, the IASC NATF developed the Multi-Cluster/Sector Initial Rapid Assessment (MIRA) Approach. A MIRA is the assessment and analysis of needs carried out during the first two weeks of a sudden onset disaster. It is a multi-sector assessment carried out by key stakeholders which endeavours to provide the basic information fundamental to all actors, namely the overview of affected population needs and response priorities for international support. The MIRA allows stakeholders to reach a shared understanding of the humanitarian situation and its likely evolution at its earliest stages to support initial strategic response decisions. The development of the MIRA approach has benefited from the wealth of experience and knowledge from United Nations organizations, NGOs, donors technical experts and academia and builds upon decades of field practice, lessons learned and existing guidance, tools and methodologies developed by NGOs, clusters and agencies. It reflects a common vision of that which is both methodologically sound and realistically feasible given the highly challenging environment in which humanitarian needs assessments are frequently undertaken.

Description of the information structure

The goal of the MIRA is to structure and reinforce the processes, methodologies and tools supporting multi-sector/cluster assessments. Its key “added value” is to provide an approach that facilitates cross-sectoral analysis. The process underpinning the approach aims to be sufficiently explicit so as not to be misinterpreted but flexible enough to be adapted to the specific needs of each crisis, and to minimize delays in the assessment schedule. The MIRA is articulated around three fundamental components, Secondary Data Review, Community Level Assessment and the Analytical framework.

Secondary Data Review

The analysis of secondary data should be undertaken on a rolling basis as new information becomes available. Information should be organized into **Pre Disaster** Information and **Post Disaster Secondary** Information and it should be organized around date, group and location.



An example of the most common areas of focus for secondary data review:

Table 19: Example of the most common areas of focus

Focus	Content
Pre-post crisis	Pre crisis vs post crisis data
Geographical	National key indicators vs “affected area” key indicators
Group	Total population vs specific sub-groups demographic data (refugees vs residents)
Livelihood	Characteristic of different sub-set of socio-economic profiles (farmers vs pastoralists)
Vulnerability	Characteristics of different vulnerable groups (disabled, food insecure, unemployed, etc.)
Catchment area	Characteristic of different livelihood zones (urban vs rural, mountainous vs riverine)
Gender and age	Characteristics of different categories of the population (Women vs men, elders vs youth)
Sector	Characteristics of different sectors (water and sanitation, health, food security, etc.)

Community level assessment

The Community Level Assessment focuses mainly on qualitative information. It is based around four core modules:

- The **Metadata Module** gathers a description of the assessment (date and team) and of the community assessed (location as well as type of settlement, setting and population) to ensure that data can be traced as well as stratified in the analysis.

Example of a standard investigation questionnaire form for a particular situation:
Metadata Module



Table 20: Example of a standard investigation questionnaire form

Date.	
Name of Assessor / Assessment Team.	
Province.	
District.	
Sub-District.	
Place Name.	
Settlement Type.	
Setting type.	
Population Type.	
GPS Coordinates.	X. _____ Y. _____

- The **Generalist Key Informant Module** gathers all questions aimed at generalist key informants. It is articulated around three components: screening questions, scoping questions, and ranking and identification of most affected groups.

Screening and Scoping: The screening questions may contain some or all of appropriate questions (based on the HESPER scale) which is detailed in http://reliefweb.int/sites/reliefweb.int/files/resources/Full_Report_2405.pdf

The questions are based around broad identified categories in the HESPER scale.



Table 21: Broad identified categories in the HESPER scale

1	Drinking Water
2	Food
3	Place to Live In
4	Toilets
5	Keeping Clean
6	Income or Livelihood
7	Physical Health
8	Health Care
9	Safety
10	Education for your children
11	Support from Others
12	Separation from family members
13	Being displaced from home
14	Information
15	The way aid is provided
16	Respect
17	Moving between places
18	Alcohol or drug use in your community
19	Mental illness in your community

Scoping questions allow for a more in-depth investigation of the items identified as a “serious problem” to affected communities.

An example of the questionnaire is below.

Table 22: Questionnaire example

1. Is there a serious problem in your community because people do not have enough water that is safe for drinking or cooking?		
Yes. <input type="checkbox"/> No. <input type="checkbox"/> Unknown. <input type="checkbox"/>		
What are the main sources of water in your community (Rank up to 4)?		
Borehole or well with functioning motor pump		<input type="checkbox"/>
Borehole or well with functioning hand pump		<input type="checkbox"/>
Protected spring		<input type="checkbox"/>
Protected open well		<input type="checkbox"/>
Piped water		<input type="checkbox"/>
Unprotected spring		<input type="checkbox"/>
Unprotected open well		<input type="checkbox"/>
Surface water		<input type="checkbox"/>



Ranking

Ranking allows key informants to establish priorities among the items identified as a “serious problem” to the community. The ranking can be done, if relevant, by identifying the specific groups within the community that are more affected by the problem.

An example of the ranking and identification of most affected groups:

Table 23: Example of the ranking and identification of most affected groups

Rank	Screening item	Most affected groups	
1	Priority concern #1	Men	<input type="checkbox"/>
		Women	<input type="checkbox"/>
		Boys	<input type="checkbox"/>
		Girls	<input type="checkbox"/>
		Older persons	<input type="checkbox"/>
		Persons with disabilities	<input type="checkbox"/>
		Particular ethnic or religious groups (Specify).	<input type="checkbox"/>
		Other (Specify).	<input type="checkbox"/>
		All groups are affected in a similar way	<input type="checkbox"/>
		Do not know	<input type="checkbox"/>
2	Priority concern #2	Men	<input type="checkbox"/>
		Women	<input type="checkbox"/>
		Boys	<input type="checkbox"/>
		Girls	<input type="checkbox"/>
		Older persons	<input type="checkbox"/>
		Persons with disabilities	<input type="checkbox"/>
		Particular ethnic or religious groups (Specify).	<input type="checkbox"/>

- The **Specialized Key Informant Module** gathers all questions aimed at specialized key informants, including health staff, teachers, sanitation engineers, staff from local specialized NGOs, etc. It aims at identifying and, when appropriate, ranking key concerns within a given sector and may be led independently from the Generalist Key Informant Module.
- The **Assessment Team Module** is a two-fold discussion that takes place at the end of the field visit and that allows the team to draw its own conclusions. Serving as a first



level analysis, it aims at gathering critical observations made during the field visit, such as potential sources of contamination (e.g. human faeces) visible near water sources or shelters. Second, it tries to identify, using the screening and ranking components of the Generalist Key Informant Module, which items constitute “serious problems”, based on the elements gathered during the visit. Team members must identify potential groups within the community that are most affected by any given problem. A severity index should be attributed to each issue identified as a key concern. Finally, the team is asked to provide elements to explain and justify their conclusions.

An example of the Assessment Team Module Priority and Ranking:

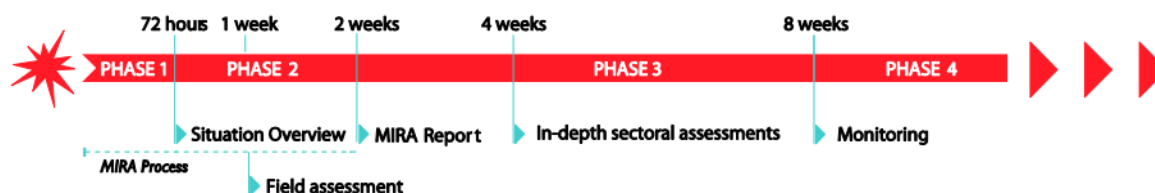
Table 24: Example of the assessment team module priority and ranking

Rank	Screening item	Most affected groups	Severity	Comments / justification
1	Priority concern #1	Men		
		Women		
		Boys		
		Girls		
		Older persons		
		Persons with disabilities		
		Particular ethnic or religious groups (Specify).		
		Other (Specify).		
		All groups are affected in a similar way		
		Do not know		

- **Analytical framework.** Underpinning each step of the MIRA approach, the analytical framework supports the identification of information needs and sources, facilitates the collation of secondary and primary data and provides a structure for reporting on findings. It thus helps humanitarian actors reach a common understanding on key strategic priorities.



Figure 7: Assessment and Monitoring Framework including MIRA phases



The final analysis and interpretation of key humanitarian priorities can take place once the information gathered through the secondary data review and the community level assessment has been reconciled within the analytical framework Report, Disseminate and Communicate the Findings.



- **Preliminary Scenario Definition (Phase 1)**

Table 25: Preliminary scenario definition

PRELIMINARY SCENARIO DEFINITION (NAME OF COUNTRY)	
SITUATION OVERVIEW Description of Crisis: Overall Impact, Severity of Crisis: Affected Groups: Affected Sectors:	HUMANITARIAN PROFILE (Common Operational Datasets) NEEDS (Needs per sector)
HUMANITARIAN ACCESS Logistics: Security Constraints: Civil Military:	RESPONSE CAPACITY (In country capacity and gap analysis)
COVERAGE AND GAPS (In country capacity and gap analysis) 	STRATEGIC HUMANITARIAN PRIORITIES (In country capacity and gap analysis)



SCENARIOS

Name of the Scenario		Probability level					
Most likely/middle scenario		Impact level					X
Core Assumptions and Impact							
Assumptions (risks, opportunities and triggering factors): General Impact and effects of the crisis (estimates of affected population, and displacement patterns, price rises, market disruption, destruction of crops, etc): Affected Areas: Response capacity and gap analysis:							
Population at Risk and Anticipated Duration of tEmergency							
Affected groups (e.g. IDPs is a population at risk in the case of further flooding) and their characteristics (numbers, demographics, specific vulnerable groups, coping mechanisms): How are they affected (e.g. displaced in inadequate shelter, access to basic services, losses of assets): Location (e.g. in public building in urban areas, in camp settlement etc): Duration of the emergency situation. Time period during which assistance is required:							
Operational Constraints							
Security, access, communication:							
Priority Needs							
Most affected groups: Most affected areas: Sectors requiring immediate assistance: Key interventions (including intervention/assessment preparedness measures)							

- MIRA Report (Phase 2)

Two weeks after the disaster, a final MIRA report is produced to inform the revision of the flash appeal. The report consolidates the findings of the secondary data review and the community level assessment into one single product. It responds to the same key questions as the preliminary scenario definition and has a similar structure based on the analytical framework.

The preliminary scenario definition can be updated as often as required until the final MIRA report is written. Updates may be prepared upon request or after any significant changes in the situation (e.g. an increase in the number of affected populations, a report of new affected areas or vulnerable groups, an increase in population movement, etc.).



3.7 IASC

- **Areas:** Units of measurements for assessments
- **Geographic levels:** Communities, institutions, households, individuals
- **Phase** (risk reduction; relief; early recovery; recovery): n/a
- **Structured vs unstructured information:** Structured information
- **Contribution to information management in humanitarian aid:** Defines four common units of measurements used in humanitarian needs assessments.
- **Organizations supporting this model/methodology:** Inter-Agency Standing Committee (IASC)
- **Referent website or document:** <http://www.humanitarianinfo.org/iasc/>
- **Relevant document(s) describing the model/methodology:** [IASC12]
- **Objective and creation context:** "An ideal needs assessment collects exactly what is required for decision-making, fundraising and advocacy, no less and no more."

Description of the information structure

The four most common units of measurement used in humanitarian needs assessments, listed from largest to smallest, are:

Table 26: Most common units of measurement used in humanitarian needs assessments.

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

Not only will the unit of measurement affect the type of information obtained from the needs assessment, it will also have an impact on the time and the amount of resources needed to conduct it and the volume of data that will be received as a result. The smaller the unit of measurement, the larger the data volume will be.

3.8 3W

- **Areas:** Organizations, people, contact data, UN clusters
- **Geographic levels:** not relevant
- **Phase** (risk reduction; relief; early recovery; recovery): Relief, early recovery, recovery



- **Structured vs unstructured information:** Structured information
- **Contribution to information management in humanitarian aid:** The “Who Does What Where Database and Contact Management Directory” presents two information structures: (1) a contact list of the staff of involved organizations and (2) a matrix structure for the cluster affiliations of these organizations
- **Organizations supporting this model/methodology:** UNOCHA
- **Referent website or document:** <http://3w.unocha.org/WhoWhatWhere/>
- **Relevant document(s) describing the model/methodology:** unknown
- **Objective and creation context:** The 3W was created in 2007 by the Inter-Agency Information Management Working Group. The goal was to implement a coordination instrument for having information about the staff and cluster affiliation of involved organizations in a humanitarian relief situation.

Description of the information structure

The 3W includes two information structures: (1) a contact list of the staff of involved organizations and (2) a matrix structure for the cluster affiliations of these organizations.

Table 27: Contact list sample (1).



**3W - Who What Where
OCHA Indonesia
Contact List - Organization**

Monday, February 17, 2014

Name	Last Name	Title	Phone	Email
1001 BUKU				
Ellen	Ellen		M:0856-43362319	lurah_jogja@yahoo.com
Aceh Operations				
Simon	Field	Head of UNDP Aceh	M:0811 806 731	simon.field@undp.org
Aceh Operations (IDEP)				
Dessy	Haryanti	Aceh Recovery Programme Admin Manager		dessy@gfs.idepfoundation.org
Roberto	Hutabarat	Aceh Recovery Programme Coordinator		roberto@gfs.idepfoundation.org
Cristina	Moreno	Aceh Recovery Programme Liaison		cristina@gfs.idepfoundation.org
ACTION CONTRE LA FAIM (ACF)				
David	Kerespars	Head of Mission	L: 722 0775	acfindo@yahoo.fr
I Wayan	Nuarsa	Officer	L: 722 0775	wayannuarsa@yahoo.com
Yerolla M. H.	Sipayong	Logistic Capital	L: 722 0775	logcap@id.missions-acf.org
Rayendra	THAYEB	Assistant HoM	L: 722 0775	acf_hom.assist@yahoo.fr



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Table 28: Matrix structure sample (2)

Who What Where Project Matrix By Propinsi/Province (Indonesia)													
Geographic Location Propinsi/Province	Health and Nutrition	Shelter and Camp Management	Water and Sanitation	Protection	Telecomms	Logistic	Early Recovery	Nutrition	Education	Agriculture	Pandemic	Food Security	Health Shell
Daerah Istimewa Yogyakarta	AAI CHF HANDICAP IRD KNH MENTOR MCY-CORPS NICCO PLAN MERCY-MY OXFAM YEU CWS	AMERICARES CRS AAI CARDI IRC MCY-CORPS NICCO PLAN OXFAM WR CWS	AMERICARES AAI CARDI IRC MCY-CORPS PLAN OXFAM SCUK YEU	CARDI KNH NICCO PLAN OXFAM SCUK YEU IFRC PMI	IBM CRI MENTOR IFRC PMI YPARAS IMA LPPM ARTHA GRH PT. SIMS	CRS CWS IFRC PMI ALIANSI BE PELHMI YTBI YPARAS ICM RAKATA ADV UGM JRS	ADRA CRS CHF EA CARDI HIVOS MCY-CORPS IMC MERCY-MY OXFAM RI CWS	AMERICARES HIVOS IR IRD KNH CARE NICCO PLAN SCUK WVI IFRC PMI ALIANSI BE PITI	ADRA AMURT EA IR KNH NICCO PLAN SCUK WVI IFRC PMI JAPAN-RC	RI IFRC PMI YTBI PAO I PPM POSKO JB DIKNAS	MERCY CORPS		

3.9 SPHERE

- **Areas:** Water supply, sanitation and hygiene promotion, food security and nutrition, shelter, settlement and non-food items, health action
- **Geographic levels:** No reference to geographic levels
- **Phase** (risk reduction; relief; early recovery; recovery): Relief, early recovery
- **Structured vs unstructured information:** Unstructured information
- **Contribution to information management in humanitarian aid:** Defines four core standards for humanitarian aid that containing recommended actions and indicators. The standards contain mostly unstructured information. For some topics concrete numbers are given. Includes a lot of literature references for further reading.
- **Organizations supporting this model/methodology:** The project is supported by a range of different organizations, e.g. International Federation of Red Cross and Red Crescent Societies, World Vision, The Salvation Army
- **Referent website or document:** <http://www.sphereproject.org>
- **Relevant document(s) describing the model/methodology:** [SPHERE11]
- **Objective and creation context:** Four “core standards”: “They describe processes that are essential to achieving all the Sphere Minimum Standards. They are a practical expression of affected people’s right to assistance that supports life with dignity.” [SPHERE11: p. 8]. Based on “protection principles”: “The Protection Principles are based on the fact that the state has the primary (legal) responsibility in the protection of people affected by disaster and armed conflict. Humanitarian agencies need to work on protection when states are unable or unwilling to protect their population. And much of the protection work that humanitarian agencies do in fact is to advocate and promote for those who have the legal mandate to protect the population to discharge these responsibilities.” [SPHERE11: p. 7].



Description of the information structure

Figure 8: Overview of the four core standards

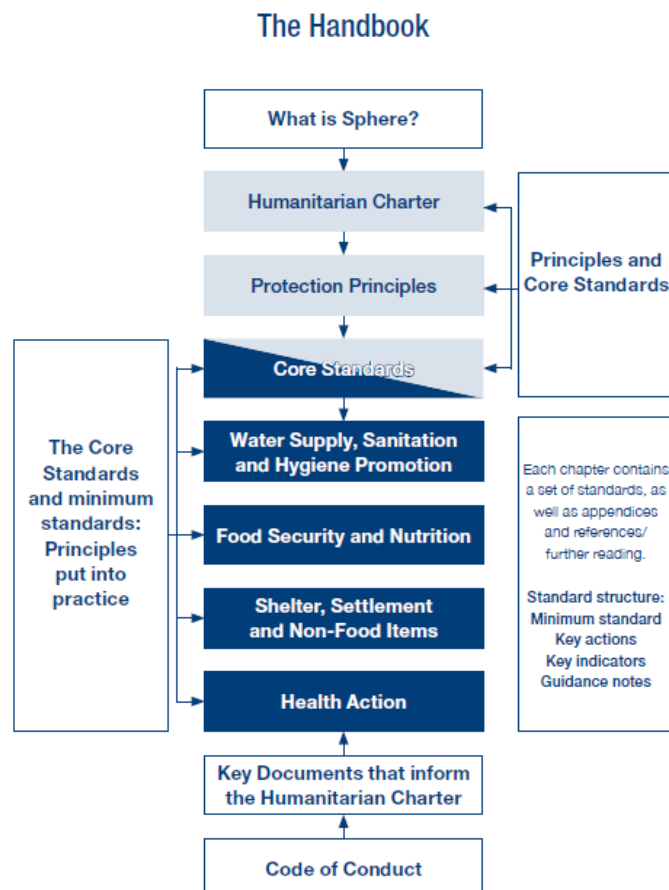
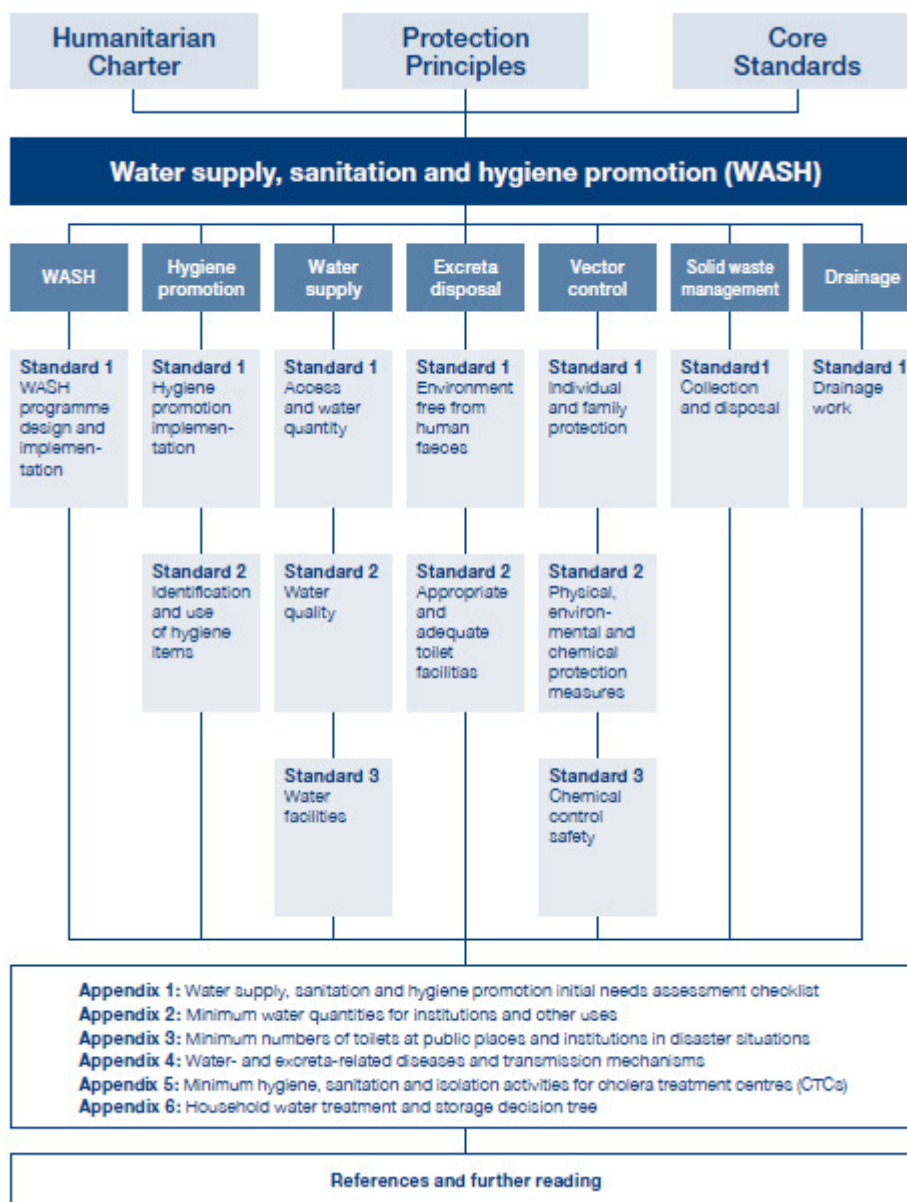




Figure 9: Core standard “Water Supply, Sanitation and Hygiene Promotion” (1)





Humanitarian Charter	Protection Principles	Core Standards
<h2 style="text-align: center;">Food security and nutrition</h2>		
<p>Food security and nutrition assessment</p> <p>Standard 1 Food security</p> <p>Standard 2 Nutrition</p>	<p>Infant and young child feeding</p> <p>Standard 1 Policy guidance and coordination</p> <p>Standard 2 Basic and skilled support</p>	<p>Management of acute malnutrition and micronutrient deficiencies</p> <p>Standard 1 Moderate acute malnutrition</p> <p>Standard 2 Severe acute malnutrition</p> <p>Standard 3 Micronutrient deficiencies</p>
		<p>Food security</p> <p>Standard 1 General food security</p> <p>Food security – food transfers</p> <p>Standard 1 General nutrition requirements</p> <p>Standard 2 Appropriateness and acceptability</p> <p>Standard 3 Food quality and safety</p> <p>Standard 4 Supply chain management (SCM)</p> <p>Standard 5 Targeting and distribution</p> <p>Standard 6 Food use</p> <p>Food security – cash and voucher transfers</p> <p>Standard 1 Access to available goods and services</p> <p>Food security – livelihoods</p> <p>Standard 1 Primary production</p> <p>Standard 2 Income and employment</p> <p>Standard 3 Access to markets</p>
<p>Appendix 1: Food security and livelihoods assessment checklists</p> <p>Appendix 2: Seed security assessment checklist</p> <p>Appendix 3: Nutrition assessment checklist</p> <p>Appendix 4: Measuring acute malnutrition</p> <p>Appendix 5: Measures of the public health significance of micronutrient deficiencies</p> <p>Appendix 6: Nutritional requirements</p>		
<p style="text-align: center;">References and further reading</p>		



Figure 11: Core standard “Shelter, settlement and non-food items” (3)

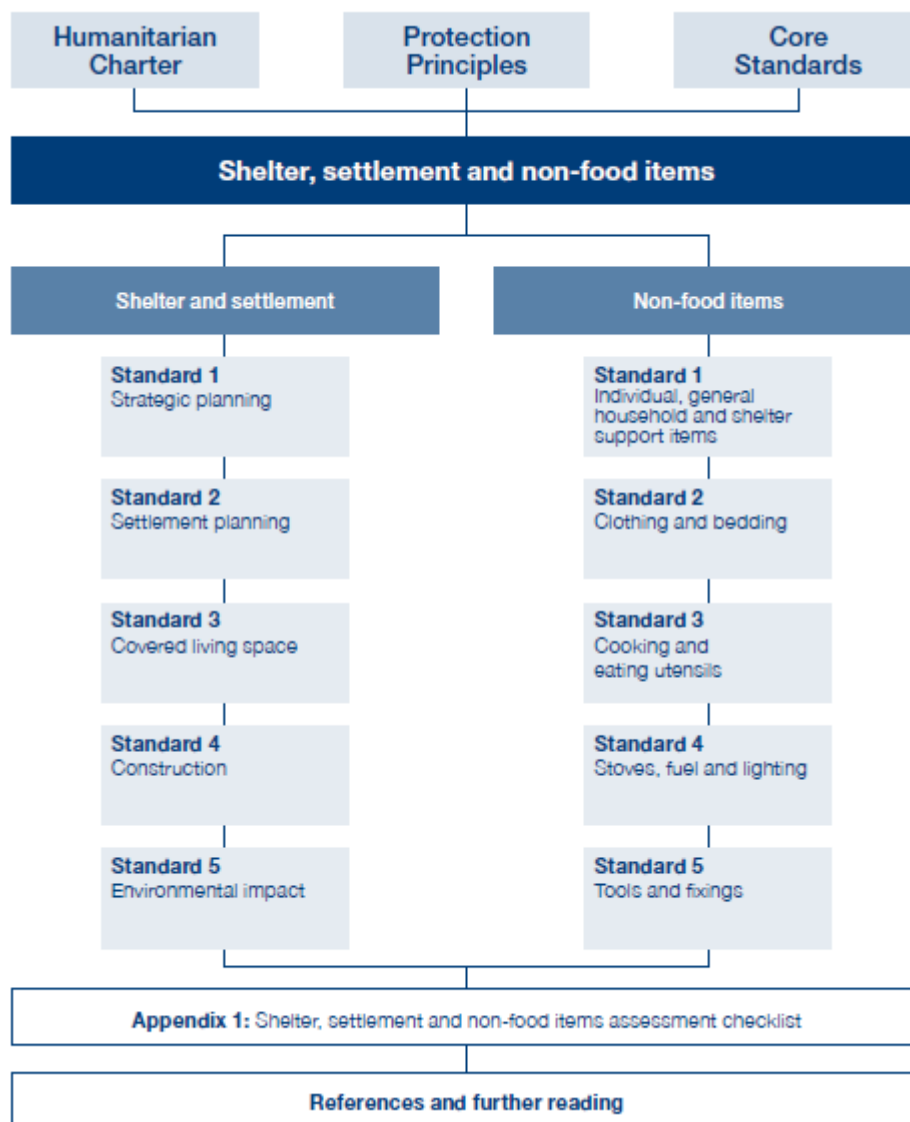
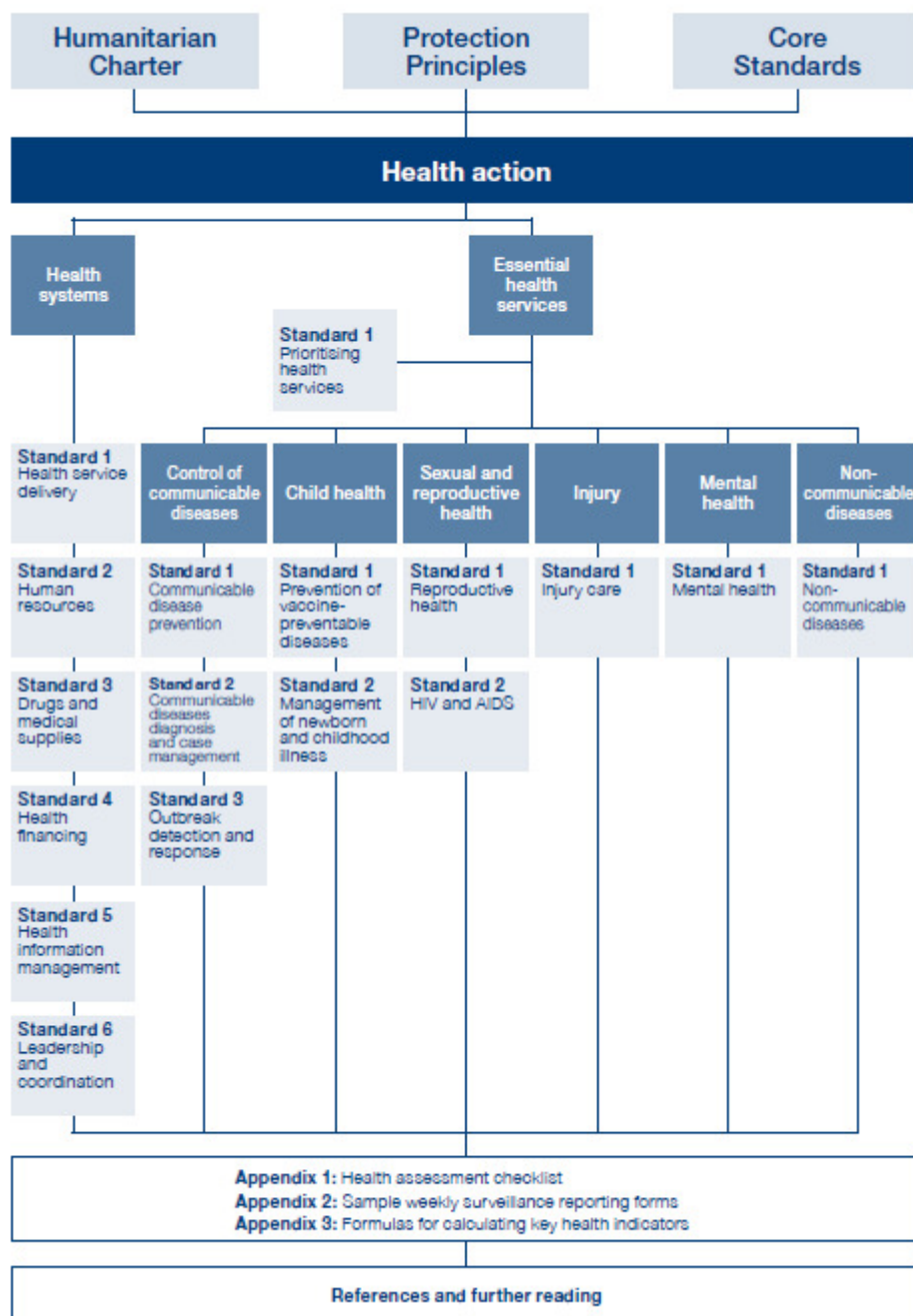




Figure 12: Core standard „Health“ (4)





4 Information in DESTRIERO

4.1 Demanded Information for End-Users from DESTRIERO

4.1.1 Demanded Information by AMI

During crisis response and with linkage with recovery actions, AMI will act based upon the following external information, having in mind that initial post disaster information at the emergency stage will be of most importance, allowing the monitoring of its evolution and deciding when to enter in recovery interventions. By this, most information should be stored and presented in time line format.

Table 29: Key demographic indicators

Key demographic indicators	
Information needed	Unit (if adequate)
Total population	Overall number
Population living in rural areas	Percent (%)
Gross national income	Per capita
Total fertility rate	Per woman
Life expectancy	At birth
	At 60 years old
	Under five years old

Table 30: Key Health indicator

Key Health indicators	
Information needed	Unit (if adequate)
Mortality rate by cause of death	Percent (%) of adults
	Percent (%) of under five years old children.
Immunization DTP3 and Measles	Percent (%)
Incidence rates of tuberculosis, malaria, HIV and other relevant diseases for the country	Percent (%)
Burden of disease	Percent (%)
Utilization of health services	Overall number
	Percent (%)
Human resources for health	Overall number
	Percent (%)
Total expenditure on health	Per capita
Population using improved water and sanitation	Percent (%)
Estimated number of dead	Overall number
Estimated number of affected	Overall number



Table 31: Other relevant information

Other Relevant Information	
Information needed	Unit (if adequate)
Population movement? How many estimated, to where?	Overall number Percent (%) Directions of move
Number of functional and damaged health infrastructures	Overall number Percent (%) By level of care provided By inpatient capacity
Immediate and urgent health needs	Overall number Percent (%)
Partners already set and responding	Overall number
Health Referral system put in place	Not relevant (qualitative data)
Already identified multi-sectoral needs	Not relevant (qualitative data)
Official treatment protocols available	Not relevant (qualitative data)
Any other guidelines on the specific humanitarian response available	Not relevant (qualitative data)
4W Matrix (for recovery) – Who does What Where When. With mapping	Not relevant (qualitative data)
Cluster List of contacts	Not relevant (qualitative data)
Local Authorities with contacts and mapping Local governor or mayor, Water and sanitation entity, Health district or regional director, Functioning health local structures responsible)	Not relevant (qualitative data)

Table 32: Security situation

Security situation	
Information needed	Unit (if adequate)
Database on the Aid Worker Security Database (www.Aidsecurity.org)	Not relevant

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



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Table 33: Logistic

Logistic	
Information needed	Unit (if adequate)
Access to the affected area	Not relevant (qualitative data)
Legal procedures for entering and staying up to one year in the country and affected region	Not relevant (qualitative data)
Telecoms access and network mapping	Not relevant (qualitative data)

Table 34: Humanitarian delivery performance

Humanitarian delivery performance	
Information needed	Unit (if adequate)
Aid delivery: Sphere Project core and minimum standards	Not relevant (qualitative data)
Human Resources: People In Aid principles at the code of good practice	Not relevant (qualitative data)
Management: The 2010 HAP Standard in Accountability and Quality Management	Not relevant (qualitative data)
Evaluations on humanitarian response (for the specific crisis): ALNAP	Not relevant (qualitative data)

Table 35: Funding.

Funding	
Information needed	Unit (if adequate)
What funding is available for the crisis (committed and uncommitted by sector)	Local currency and euro (€)
Who is funding what?	Not relevant (qualitative data)
Local NGOs seeking funding by sector	Not relevant (qualitative data)
Sources: OCHA Financial Tracking Service - http://fts.unocha.org/	Not relevant (qualitative data)
DG ECHO - http://ec.europa.eu/echo/funding/decisions_2014_en.htm	Not relevant (qualitative data)
Embassies	Not relevant (qualitative data)

4.1.2 Demanded Information by SGSP

Demanded information, crucial in recovery phase of crisis management, is closely connected with values protected by the state. In purpose to categorize appropriate information



sources, following division into most important areas of widely understood safety and security might be used.

1. Common safety

- Protected areas: life and health, as well as property and livestock in extent necessary for citizens' survival.
- Typical activity: widely understood protection of citizen, including rescue operations, protection of drinkable water sources.
- Typical institutions involved: local authorities, fire brigade (both professional and volunteer), Water Voluntary Rescue Service and other voluntary rescue services.

Table 36: Common safety

Common safety	
Information needed	Unit (if adequate)
Daily overall situation reports from headquarters/ local authorities or involved institutions (like: UNOCHA)	Not relevant
Detailed contact lists of involved organizations and public entities at the scene	Not relevant (qualitative data)
Contact details to liaison officer, interpreters, etc.	Not relevant (qualitative data)
Priority list of critical infrastructure in involved region	Not relevant (qualitative data)
Up-to-date maps, preferably updated satellite images of disaster maps	Not relevant (qualitative data)
Most suitable for present situation methodology for needs assessment	Not relevant (qualitative data)
External communication strategy procedures	Not relevant (qualitative data)
Availability of additional technical equipment	Type of available equipment Number of available equipment
Weather forecasts	Not relevant (qualitative data)

2. Public security

- Protected areas: law enforcement in order to ensure citizen security and personal inviolability.
- Typical activity: preventing and fighting offences and crimes, especially kidnaps, fights, murders, robberies, etc.
- Typical institutions involved: local authorities, police department, city police, security company.



Table 37: Public security

Public security	
Information needed	Unit (if adequate)
Report of newly formed threats in scope of widely understood security (including the security of operations themselves)	Not relevant
Available human resources, contact details	Type of available human resources Number of available human resources
Available means to ensure physical protection of victims, rescuers and operations themselves.	Type of means Number of means
Maps of evacuated/abandoned areas	Not relevant (qualitative data)

3. Economic security

- Protected areas: financial prosperity and sustainable development in the light of economic determinants.
- Typical activity: ensuring undisturbed economic development, access to necessary resources, agricultural development and diversification of energy sources.
- Typical institutions involved: authorities of local and national/federal level, public and private enterprise, banking sector.

Table 38: Economic security

Economic security	
Information needed	Unit (if adequate)
Contact details concerning institutions in charge of resources allocation	Not relevant (qualitative data)
Procedures for resource (financial and/or material) allocation	Not relevant (qualitative data)
Socio-economic impact assessment report	Not relevant
Information concerning agreements in force with private institutions entitled to deliver goods necessary in recovery/reconstruction phase	Not relevant (qualitative data)

4. Social security

- Protected areas: quality of life, poverty, balanced development, social equality, welfare.
- Typical activity: ensuring appropriate quality of life, preventing poverty, social exclusion, balanced social development in the light of social determinants, protection of not independent persons (e.g. people with disabilities) and families.



- Typical institutions involved: local authorities, social services, NGO's, medical services, etc.
- Report on types and possible threats posed by waste stored in involved area
- Information concerning most crucial cultural differences between involved rescuers and local societies.

Table 39: Social security

Social security	
Information needed	Unit (if adequate)
Availability and location of public health services, drugs supplies, etc.	Not relevant (qualitative data)
Availability and location of health services provided by NGOs involved in operations	Not relevant (qualitative data)
Procedures to deal with present health hazards	Not relevant (qualitative data)
Weather forecasts	Not relevant (qualitative data)
Socio-economic impact assessment report	Not relevant (qualitative data)
Humanitarian help institutions involved – contact details, capabilities, resources (e.g. availability of clean water, shelter, medical care)	Not relevant (qualitative data)
Information on the involvement of mass-media, contact details, usefulness during the operations	Not relevant (qualitative data)

5. Ecological security

- Protected areas: environment protection, use of resources, preventing degradation and conservation of natural heritage.
- Typical activity: sustainable and equitable use of resources, direct environment protection, waste management, decontamination, land rehabilitation.
- Common security subjects are (e.g.) local authorities, State Fire Brigade, volunteer fire brigades, NGO's and state environment institutions.

Table 40: Ecological security

Ecological security	
Information needed	Unit (if adequate)
Weather forecasts	Not relevant (qualitative data)
Up-to-date satellite images, geospatial information on hydrological situation, transportation, topographical maps	Not relevant (qualitative data)
Report on most crucial natural heritage sites in involved region	Not relevant (qualitative data)
Report on types and possible threats posed by waste stored in involved area	Not relevant (qualitative data)



4.1.3 Demanded Information by PSNI

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

The Police Service of Northern Ireland (PSNI) works within the Civil Contingencies community using the 6 principles of Integrated Emergency Management (IEM), which are:

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

In the United Kingdom, the Police Service leads during the Response Phase of a Major Incident and sets the Strategic Aim. The Recovery Phase is led by either local or central government, depending in the scale of the incident. A Strategic Recovery Group (SRG) is formed, which co-ordinates the recovery effort. Specialist advice would be required and a Science and Technical Advice Cell (STAC) would be formed of subject matter experts.

The Recovery Phase should begin at the earliest opportunity following the onset of an emergency, running in tandem with the response to the emergency. It continues until the disruption has been rectified, demands on services have returned to normal levels, and the needs of those affected (directly and indirectly) have been met. While the response phase to an emergency can be relatively short, the recovery phase may endure for months, years or even decades.

The Recovery Phase consists of a number of sub-phases:

- Relief: The relief effort covers the immediate humanitarian needs of the community;
- Remediation: Remediation covers the assessment of infrastructure loss & the subsequent repair and addresses environmental damage; and
- Regeneration: Regeneration establishes the new normal, brings about economic growth and engenders community well-being.

The identification of Information sources during the Recovery Phase is vital to inform decisions. Information gathered during the Anticipation Phase forms the pre-disaster baseline information and includes:

- Population and demographics;
- Individual agency Vulnerable Persons Lists;
- Locations of critical infrastructure;
- Locations of hospitals, schools and care homes;
- Mapping; and



-
- Command and Control Centres and systems.

Post-disaster the demand for timely, accurate and trusted information to inform decisions is of great importance. This covers raw data from the field and is set against the pre-disaster baseline data. Generating a preliminary assessment of damage using satellite and aerial photography overlaid onto a common mapping system informs the PDNA process and provides base data for reconstruction efforts.

A missing persons reporting system, known as Disaster Victim Identification (DVI), Causality Bureau would be opened, if required. This is operated by the Police Service and is, therefore, of a high standard. Utility companies operate to international standards and information provided by them regarding damage to infrastructure and repair lead in times would be trusted. Business Continuity Plans (BCP) would provide individual agencies with the actions to be taken to mitigate the negative impact of an incident and would provide information on operating levels.

A focal point is the analysis of the quality of the data, which serves as a baseline for critical decisions. Where this data comes from and the level of trust attached to it is taken into account during this analysis. In turn it informs decisions taken about priorities and initiated actions.

For example, Land and Property Services (LPS) is a government agency, which provides mapping for multi-agency use during such incidents. LPS operates to the EU SOLICE standards and therefore the level of trust in their product is high. Other agencies share baseline information with LPS, which is then layered onto the mapping and is able to inform post incident assessments and decision making during the Response and Recovery Phases.

A Common Recognised Information Picture (CRIP) would be agreed, which included post incident assessments on fatalities, casualties and damage to housing stock & critical infrastructure and actions to reduce the adverse effects on the community would be agreed. This would establish the post-incident baseline.

The main aspect of this activity is to ensure the decisions made are based upon as much information as possible and that appropriate multi-agency consultation has been conducted, where possible.

The HM Government Emergency Response and Recovery guidance document informs this aspect of a Major Incident along with previously conducted impact assessments, either from incidents within the UK or similar incidents internationally.

4.1.4 Demanded Information related to Myriad

During collaborative meetings of working groups involved in PDNA and RRP processes where consensus needs to be established, different participants – typically from various stakeholder organizations - usually propose a range of solutions regarding reconstruction



and recovery prioritization and planning, and all proposals are discussed collectively. In the end the best solutions needs to be identified.

TRT has developed a multi-criteria decision analysis tool and methodology – called MYRIAD that will support this process. We propose to use MYRIAD to manage the prioritization of the reconstruction and recovery projects.

According to the information structures detailed previously, we propose to organize information by sector (Health, Education, Housing, Employment...) and geographic area.

In input, the decision process may have some reconstruction and recovery project descriptions, and information on the previous situation, on the current situation and on the expected new situation.

1. **Information on the normal situation** can consist in the description of the normal situation: number of schools (or number of pupils in primary/secondary school) per neighbourhood or village, population on each city neighbourhood or village, number of hospital or proportion of hospital bed per inhabitants... It can also directly be the normal situation rates on each sector (e.g. number of schools per 10,000 inhabitants). This information can be provided by local administrations or by national statistics institutes.
2. **Information on post-disaster situation and its evolution** can consist for each geographic area in the description of the accessibility situation (contaminated area? flood area? usability of local transport infrastructures) and its evolution (estimated date for a normal accessibility), risk aspects (identification of 'no-build' areas due to risks related to flood, earthquake...), and the usability of each area/building (related to electricity and water access). General information on the current situation can also be useful: number of inhabitants still in each area, number of not affected schools, buildings... This information can be provided by local administrations, by experts (information on flood, earthquake or NRBC situation), or by humanitarian contributors through questionnaires to inhabitants. The information is collected and gathered thanks to information sources specialized in disaster management as those described in chapter 2 (UNOCHA, GDACS, ReliefWeb, HAP etc.).
3. **Information on the expected new situation** can be the estimated population size after the reconstruction and recovery phase in each geographic area, taking into account the accessibility and risk information.
4. **Information related to reconstruction and recovery projects** have to support the identification of each project priority, and the relevance of a set of projects.
To identify the priority of each project, information related to the current situation on the geographic area of the project (accessibility, risk, usability) can be relevant. The importance for each project can be related to the number of people associated (number of inhabitants in case of a housing building reconstruction project, number of pupils in case of a school reconstruction project, number of jobs and size of the



population covered in case of an hospital reconstruction project etc.). At least necessary information is the cost of each project and its contribution on its sector (number of classrooms or pupils for a school, number of flats or associated inhabitants for a housing building etc.).

The expected new situation in each area has to be taken into account in order to identify the relevance of a set of projects and to check if the set of projects is in phase with the expectations.

The information structures presented in chapter 3 provide ways to organize the information during and after a disaster. Next table shows examples of information that could be obtained after a disaster and that could be useful to determine the priority of each reconstruction and recovery projects, and the relevance of sets of such projects.

Table 41: Information useful to determine the priority of reconstruction and recovery projects

Information target	Category	Information structure name or sources	Information examples
Normal situation description	all	National, regional, local administrations	
After disaster situation description	Accessibility, usability	DaLA	Infrastructure - transport/roads, electricity, water supply and sanitation Cross-cutting – disaster risk management
		TRIAMS	Roads damaged, Bridges damaged/destroyed, Electricity supply damaged/destroyed, Roads repaired <ul style="list-style-type: none"> - # of km of repaired/new road, by type of road, by district - # of bridges repaired, by district
	Health	DaLA	Social—health
		TRIAMS	Health facilities damaged/destroyed Health infrastructure repaired/new <ul style="list-style-type: none"> - # of hospital beds per 10,000 population (inpatient & maternity), by sub-district/district - # of health facilities with emergency obstetric care per 10,000 population, by sub-



Information target	Category	Information structure name or sources	Information examples
			district/district
		IASC	- Average population per health facility - Number of HF with Comprehensive Emergency Obstetric Care / 500,000 population
	Education	DaLA	Social—education
		TRIAMS	Schools damaged/destroyed Schoolchildren affected School construction - # of primary school children per school, by sub-district - % of destroyed/damaged schools rebuilt or rehabilitated by category, by sub-district
		IASC	% of school-age children and youth not currently attending school/learning % of existing school buildings (a) usable; (b) unusable
	Housing	DaLA	Social—housing
		TRIAMS	Housing units destroyed/damaged Permanent housing
	Employment, Productive	DaLA	Productive sectors—agriculture, industry, land use, tourism Personal income loss – due to disaster
		TRIAMS	Unemployment caused by the tsunami - # of people employed, by different sector, by district, by gender
Expected situation description	all	Local/regional/national administrations	

To illustrate the kind of inputs useful for Myriad, we can imagine projects related to the scenario described in D2.2 (combination of earthquake, floods and radioactive contamination in Spain): a school construction project and a housing building construction projects in Almoguera. In this area, the floods are important and there is a radioactive contamination. In such situation, the following information can be relevant:

- Information on previous situation in Almoguera:



-
- Number of inhabitants;
 - Number of primary school;
 - Number of housings.
 - Information on current situation and its evolution in Almoguera:
 - Floods: Areas concerned by floods, seriousness of the floods, prevision on a return to normality after floods;
 - Radioactive contamination: Areas concerned by the radioactive contamination, level of radioactive contamination and prevision on a return to normality (or decent situation) after radioactive contamination;
 - Damages on the primary school. Consequences due to those damages (reparation, reconstruction on the same location or reconstruction in safer place);
 - Number of housings affected by floods (with levels of seriousness), and number of housings not affected;
 - Number of inhabitants still living in Almoguera.
 - Information on the new expected situation in Almoguera:
 - Number of inhabitants;
 - Number of primary school;
 - Number of preserved housing units and number of new housing units.
 - Information related to the project on a primary school reconstruction:
 - Accessibility and risk of the location;
 - Capacity of the new school;
 - Current situation of the pupils;
 - Cost.
 - Information related to the project on new housing units building:
 - Accessibility and risk of the location;
 - Capacity in housing units;
 - Current situation (need in housing units in the area).
 - Cost.

In a real situation, several projects will be proposed to rebuild the school and to build new housing units, but the available budget will be limited. Myriad will be useful to identify the set of projects having the higher priority and respecting the global budget.

4.1.5 Demanded Information related to WebGIS

The WebGIS platform provides geospatial mapping tools and allows viewing various kind of information on a map in order to provide a faster coordination of the recovery actions. DESTRIERO users will be enabled to access the integrated information via web (through the WebGIS View application) and on field through the mobile devices. In order to provide a shared situation awareness picture, the WebGIS needs as input all information useful to the users for manage the recovery an reconstruction phase.



This information can be represented on the map only if they have latitude and longitude information associated with them and if they are provided in the any of the well-known standard format for geographic information system, i.e. shapefile, gml, or kml. In the following an ordered list of the information required by user and collected in the WP2 can be found:

- Pre-Event Information:
 - Administrative and international boundaries
 - Toponyms and populated places
 - Key Indicators foreseen by PDNA and RPR , only if they are associated with a geographical position or a country, a district or a municipality:
 - Total population
 - Gross national income per capita
 - Total fertility rate (per woman)
 - Life expectancy (at birth, at 60 years old, under five years old)
 - Mortality rate by cause of death (adults and under five)
 - Burden of disease
 - Etc.
 - Satellite imagery before the disaster
 - Hydrology
 - Building (footprint, building block or build-up area on scale basis)
 - Settlements (agricultural, industrial, medical etc.)
 - Transportation network
 - Utilities (power plants, quarry, etc.)
 - Key infrastructure
 - Point of interests
 - Topographic
- Post-Event Information:
 - Satellite imagery after the disaster
 - Copernicus EMS delineation and grading maps
 - Flooded area
 - Burnt area
 - Building and Infrastructure damage assessment. The damage will be classified according to the following categories:
 - Totally affected
 - Highly affected
 - Moderately affected
 - Possibly affected
 - Radiological measures taken in different points of the affected area in order to know the contamination concentration gradient.



- Radiological activity map. In this map the more dangerous areas are marked in red and it is supposed that these areas are non-secure for persons and therefore must be closed and their perimeters patrolled. The areas marked in blue are contaminated but they can be cleaned and the persons can enter in with special measures (e.g. dosimeters, CBRN clothes and so on). The green ones are free of contamination.
- Number and location of person dead or injured (only if the figures are associated with a geographical and/or a place i.e. a town, a city)
- Delineation of an area affected by a generic disaster
- Accessibility of roads
- Location of actors (i.e. team members) and what they do
- Updated Status of key facilities
- Gathering areas
- Climatic Conditions
- Update status of buildings and infrastructures reconstruction status
- A map of devices and links status, updated in real time, to know the availability of devices in each time.
- A georeferenced data provided by the sensors
- Available safety resources (only if their position (latitude/longitude) is available)

4.2 Provided Information by DESTRIERO

The provided information detailed here is provided by existing tools that are going to be integrated into the DESTRIERO platform.

4.2.1 Provided Information related to Myriad

Various kind of information may be provided by Myriad (TRT).

First, Myriad can provide a **priority level for each reconstruction and recovery project**, based on the evaluation of intermediate values (like its importance, its accessibility or its usability). This information can be added to the description of the projects and can be shown to decision-makers.

Then, Myriad can provide an **evaluation of sets of reconstruction projects**. The objective here is to evaluate several sets of projects according to the population needs on the different sectors and geographic areas, taking into account the global available budget for reconstruction.

4.2.2 Provided Information related to WebGIS

As already discussed in the previous section, the aim of the WebGIS Platform is to show on a map all the relevant information which allows giving to the user awareness picture of the post-disaster recovery and reconstruction phase. So the information provided by the



WebGIS Platform are the same enumerated in the paragraph 4.1.5. The WebGIS platform will provide that information in two modes:

- **Visualization:** The data will be represented on the map using specific style for each kind of information. Moreover the user will be able to get the alphanumeric information related to each features represented on the map, clicking on it.
- **Export:** The layer represented on the map can be exported in several file format i.e kml, shapefile.

The WebGIS Platform is based on an open source platform for data publication over the internet and sharing through a browser based interface. It is a GIS interface over the Web which allows, among the others, the following operations:

- User Login/logout
- Search Metadata and visualize the relevant information over the interface
- Visualise WMS layers over a Map
- Download products in its native format or other format (e.g. shapefile for vector, geotiff for raster)
- Download full metadata content as XML ISO19139 file
- Customize the layers included in a map

The Visualization function is provided through a map viewer, which is a web-GIS tool for accessing the DESTRIERO products (Figure 13). From this section the user will be able to see the products for which he has permissions.

After having selected a PDNA or RRP Scenario, the user will be able to see in the Web-GIS interface the products related to that service case. The products will be listed into the Table of contents in the left side of the screen from where each layer can be enabled or disabled. It will also be possible to choose different background layers.

The menu bar of the Map Viewer will contain the classical Web-GIS functionalities (zoom in, zoom out, pan, info, etc.), a tool for measuring lengths/areas and a button to visualize the legend, which will be displayed in a floating window on top of the map.

For each layer it will be possible to view its metadata and to download the original data (shapefile, or geotiff depending on the format).

The menu bar will contain also a print functionality. It will provide the user with the possibility to export a “custom map” based on the selected layers over a selected area.

The geospatial data visualized into the Web-GIS interface can be customized (through the Map Composer tool) and the exported by the User, accordingly to the implemented user profilization and dissemination policy.



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Figure 13: Example of a Map Viewer interface

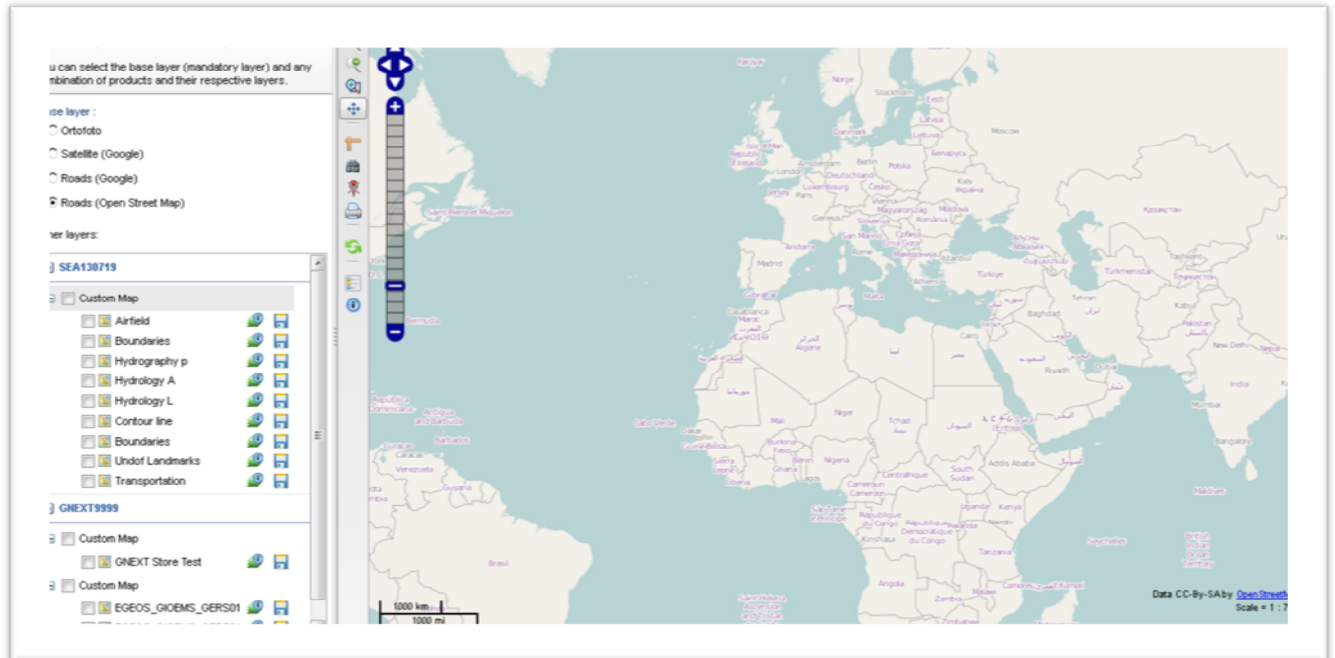
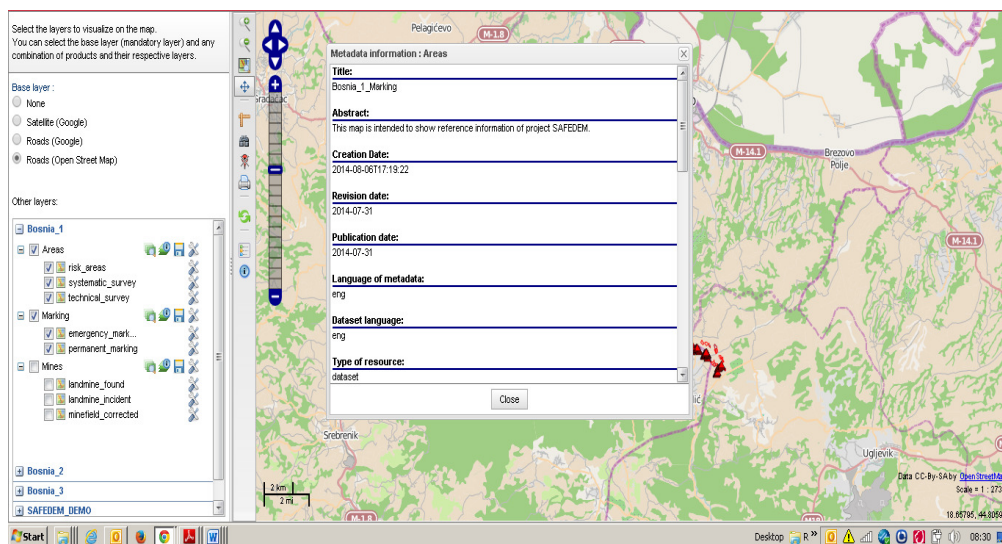


Figure 14: Example of a Metadata Download



From the Map Composer it will be possible to:

- Upload new layers (raster and vector) into the system.
- Apply specific symbology (with SLD file) to a specific layer.
- Create products (as containers of layers).
- Associate a group of layers to a specific product.



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In this way, each Scenario will be composed by a different number of products and each product will be composed by a certain number of layers.

One and the same layer can be reused to contribute to the creation of many different products.

The selected Scenario will be loaded into the Web-GIS interface where it will be possible create the customized products.



5 Information related to Interoperability Aspects

5.1.1 State of the Art on Information Sources

As described in Chapter 2, the Information sources are entities or services that provide various types of reliable information (in-depth analytical publications, daily situation reports, disaster maps, databases etc.) in relation to crisis management and potentially relevant for the DESTRIERO platform.

In the following Table 42 we are going to provide an overview and analysis of each information source with regard to information sharing, and a description of their impact on the platform definition. This analysis will be useful for the later Interoperability Information Model definition and for the Interoperability Services definition activities.

In Table 42 the Purpose/Context (PDNA) column refers to how the source relates to the four major processes within the PDNA framework i.e. Gathering Baseline Information, Assessment, Decision Making and Reconstruction and Recovery.



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Table 42 Information Sources Interoperability Aspects

Ref	Name	Provided Content Type	Provided Content	API/ Protocol	Possible Required Content	Possible Linked Sources	Description	Purpose / Context (PDNA)
2.1	UNOCHA	Email Alerts	Situation Reports; Humanitarian Bulletins; Maps and Graphics; Humanitarian Snapshots; Flash Updates; Press Releases; USG Statements	SMTP	Damages reports, Satellite maps, Humanitarian agencies information and participations, Recovery reports, Projects information, Satellite maps and disaster/recovery information and positions	2.2, 2.3, 2.12, 2.14, 2.15	Subscription list for any new OCHA information product on major humanitarian emergencies	Gathering Baseline Info; Assessment
		PDF/HTML	Publications; Daily Situation Reports	HTTP			Reports / information on variety of "themes" e.g. Emergency Preparedness, Emergency Response etc.	Gathering Baseline Info; Assessment; Decision Making
		Twitter Feeds	News / Information	HTTP			Links to content can throughout the website	Gathering Baseline Info
	UNOCHA – 3W	PDF/HTML/ RSS	Contact Lists ; Organization Lists; Project Lists	HTTP			Preconfigured reports can be generated in various content types	Decision Making; Reconstruction and Recovery
		KML	Maps	HTTP			Preconfigured Google Maps / KML can be generated	Gathering Baseline Info; Assessment; Recovery and Reconstruction



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2.2	WHO	RSS / Twitter Feeds	WHO news headlines and summary texts	HTTP	Health Organizations information, Countries Population details	Demographic and Health Surveys (DHS) reports ⁵ , Multiple Indicator Cluster Survey (MICS) reports	Tweets with links and video containing headlines, videos and summary text	Gathering Baseline Info
		PDF/HTML	Publications; Health Reports	HTTP			Digital Library with content links various reports, journals and publications	Decision Making Recovery and Reconstruction
2.3	GDACS	RSS	Alerts / GIS Data / Emergencies	HTTP	Sensors Data, Satellite and GIS Data	2.6, 2.15	Disaster events feeds / Information and data resources by event / GDACS Platform API / Lookup services of identifiers	Gathering Baseline Info; Assessment; Decision Making; Recovery and Reconstruction
		HTML	MAPS	HTTP			Map products based on satellite data or other GIS data, collected from many organisations or created for GDACS	Gathering Baseline Info; Assessment; Decision Making; Recovery and Reconstruction
		Email Alerts	Disaster Alerts	SMTP			Disaster Information	Gathering Baseline Info
		SMS	Disaster Alert	GSM			Disaster Information	Gathering Baseline Info
		HTML	Media Analysis / Reports / Assessments	HTTP			Publications	Decision Making

⁵ <http://http://www.dhsprogram.com/>



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		HTML	VirtualOSOCC	HTTP			Real time co-ordination portal for disaster managers	Gathering Baseline Info; Assessment; Decision Making; Recovery and Reconstruction
2.4	ELAC	PDF/HTML	Reports and studies on consequences of natural disasters. Publications on disaster recovery, Handbooks for Estimating the Socio-Economic and Environmental Effects of Disasters.	HTTP	Damages Reports, Health Information Reports, Recovery Information, Humanitarian Organization Information, Economic Reports	2.1, 2.2, 2.6, 2.9, 2.12, 2.14	Source of content for download / view	Decision Making; Recovery and Reconstruction
		Twitter Feeds	News	HTTP			Information Feed with URL to content	Gathering Baseline Info
2.5	GFDRR	PDF/HTML	PDNA report; DALA methodology	HTTP	Damages Reports, Health Information Reports, Recovery Information, Humanitarian Organization Information, Economic Reports	2.1, 2.2, 2.6, 2.9, 2.12, 2.14	Source of content for download / view	Gathering Baseline Info; Assessment; Decision Making; Recovery and Reconstruction
		Twitter Feeds	News / Information	HTTP			Information Feed with URL to content	Gathering Baseline Info



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2.6	ReliefWeb	JSON / RSS	Reports (demographics), infographics, documents, News, updates, maps, disaster info (maps, news), situation reports, assessments	HTTP			All content on ReliefWeb is available via APIs.	Decision Making; Recovery and Reconstruction
		Twitter Feeds	News	HTTP			Information Feed with URL to content	Gathering Baseline Info
2.7	IrinNews	RSS/Twitter Feeds/HTML	News feeds	HTTP			Information Feed with URL to content (feeds are broken down by themes e.g. natural disasters, urban risk etc.)	Gathering Baseline Info
		Email Alerts	News feeds	SMTP			Headlines and Full reports from IrinNews via email	Gathering Baseline Info
2.8	ALNAP	PDF/HTML/RSS	Publications; Reports	HTTP	Humanitarian Organization Information	2.2, 2.9, 2.12	Source of content for download / view on Humanitarian System	Decision Making; Recovery and Reconstruction
2.9	HAP	PDF/HTML	Reports; Publications; Case Studies	HTTP			Source of content for download / view on Humanitarian Accountability	Decision Making; Recovery and Reconstruction
		Twitter Feeds	News	HTTP			Information feed with content regarding accountability standards	Decision Making; Recovery and Reconstruction



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2.10	People In Aid	PDF/HTML	Publications; Reports; Case Studies; WIKIS	HTTP	Humanitarian Organization Information	2.2, 2.9, 2.12	Support for humanitarian and development sector	Decision Making; Recovery and Reconstruction
		RSS/Twitter feeds	News	HTTP			Information Feed with URL to content	Gathering Baseline Info
2.11	AIDMI	PDF/HTML	Publications; Reports; Case Studies; Videos	HTTP	Humanitarian Organization Information	2.2, 2.9, 2.12	Supporting information regarding disaster mitigation	Decision Making; Recovery and Reconstruction
2.12	REDLAC	PDF/HTML	Maps; Publications; Activities; Documents	HTTP			Exchange platform for discussion and dissemination of information related to humanitarian matters	Assessment; Decision Making; Recovery and Reconstruction
		RSS/Twitter Feeds	Alerts	HTTP			Information Feed with URL to content	Gathering Baseline Info
2.13	UNICEF	HTML	Publications; Statistics; News	HTTP	Humanitarian Organization Information, Health reports	2.2, 2.9, 2.12	Source of content for download / view	Assessment; Decision Making; Recovery and Reconstruction
		HTML/XLSX	Child Survival and Health Statistics; Child Nutrition Statistics; Maternal Health Statistics; Newborn Care Statistics; Water and Sanitation Statistics; Education Statistics; Child Protection Statistics; HIV/AIDS Statistics; Cluster Surveys	HTTP			Statistical data for each category	Assessment; Decision Making; Recovery and Reconstruction



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2.14	UNDP (Human Development Data API)	JSON/XML/CSV	Human Development Index and its Components; Human Development Index Trends; Inequality-Adjusted Human Development; Gender Inequality Index; Multidimensional Poverty Index; Command Over Resources; Health; Education; Social Integration; International Trade Flows of Goods and Services; International Capital Flows and Migrations; Innovation and Technology; Environment; Population	HTTPS			Content generated in various formats (JSON/XML/CSV for each of the content areas) via the Socrata Open Data API (SODA) using HTTPS	Assessment; Decision Making; Recovery and Reconstruction
	UNDP (Public Data Explorer)	HTML	Line graphs; bar graphs; cross sectional plots or maps for Human Development Indicators	HTTP			Online tool that generates graphs based on Human Development Indicators	Assessment; Decision Making; Recovery and Reconstruction



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2.15	GIO-EMS	GeoRss, GeoPDF, GeoTIFF, Georeferenced JPEG, Vector files (ESRI shapefiles with .prj projection files, Google Earth KML / KMZ format) HTML	Satellite based maps in digital or printed map format	HTTP			Provides various services (in "rush" and "non rush" mode) to allow access to satellite and non satellite data.	Gathering Baseline Info; Assessment; Decision Making; Recovery and Reconstruction
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The following is a summary result of the information source analysis, providing specific details based on Content Types:

Table 43: Content Type Email Alerts

Ref	Name
2.1	UNOCHA
2.3	GDACS
2.7	IrinNews

Table 44: Content Type RSS

Ref	Name
2.1	UNOCHA – 3W
2.2	WHO
2.3	GDACS
2.6	ReliefWeb
2.7	IrinNews
2.8	ALNAP
2.10	People In Aid
2.12	REDLAC
2.14	UNDP
2.15	GIO-EMS (GeoRss)

Table 45: Content Type JSON/XML/CSV

Ref	Name
2.14	UNDP (Human Development Data API)

Table 46: Content Type SMS

Ref	Name
2.3	GDACS

Table 47: Available Web Service API

Ref	Name
2.3	GDACS
2.6	ReliefWeb
2.14	UNDP (Human Development Data API)

Finally, we provide a possible overview of relationships between sources. Every required information item is linked to other possible involved sources. This will help with the next task (interoperability analysis) which involves the investigation of any possible active relationships and the information exchange between them.



Table 48: Possible Sources Relations

Ref	Provided Source	Possible Required Content	Possible Linked Source
2.1	UNOCHA	Damages reports, Satellite maps, Humanitarian agencies information and participations, Recovery reports, Projects information,	2.2, 2.3, 2.12, 2.14, 2.15
	UNOCHA – 3W	Satellite maps and disaster/recovery information and positions	
2.2	WHO	Health Organizations information, Countries Population details	Demographic and Health Surveys (DHS) reports ⁶ , Multiple Indicator Cluster Survey (MICS) reports
2.3	GDACS	Sensors Data, Satellite and GIS Data	2.6, 2.15
2.4	ELAC	Damages Reports, Health Information Reports, Recovery Information, Humanitarian Organization Information, Economic Reports	2.1, 2.2, 2.6, 2.9, 2.12, 2.14
2.5	GFDRR	Damages Reports, Health Information Reports, Recovery Information, Humanitarian Organization Information, Economic Reports	2.1, 2.2, 2.6, 2.9, 2.12, 2.14
2.8	ALNAP	Humanitarian Organization Information	2.2, 2.9, 2.12
2.10	People In Aid	Humanitarian Organization Information	2.2, 2.9, 2.12
2.11	AIDMI	Humanitarian Organization Information	2.2, 2.9, 2.12
2.13	UNICEF	Humanitarian Organization Information, Health reports	2.2, 2.9, 2.12

⁶ <http://http://www.dhsprogram.com/>



5.1.2 State of the Art on Information Structures

In Chapter 3 we have already described Information Structures that are usually defined to provide a common view of the recovery and reconstruction plan and activities. As it has already been described, the reports are usually defined in different formats, where specific methodologies have been applied. However, every methodology will have different data needs from DESTRIERO.

The following is a high level analysis (see Table 49) of possible relations between methodologies and sources have been defined. It's expected that in subsequent activities, an analysis of each of the methodology steps will be done in order to allow users to produce via DESTRIERO, reports in a standard and accepted format.

In Table 49 the Purpose/Context (PDNA) column refers to how the structure relates to the four major processes within the PDNA framework i.e. Gathering Baseline Information, Assessment, Decision Making and Reconstruction and Recovery.



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Table 49: Information Structures Interoperability Aspects

Ref	Name	Content Type	Content	API / Protocol	Possible Required Content	Possible Linked Source	Description	Purpose / Context (PDNA)
3.1	TRIAMS	PDF	Report detailing vital needs, basic social services, infrastructure, livelihoods, cross-cutting-issues.	HTTP	Health Information Reports	2.2	Methodology, process description and data capture	Gathering Baseline Info; Assessment; Decision Making; Recovery and Reconstruction
3.2	COD	ZIP (XLSX), WFP, XLSX	Geographic Data (Administrative boundaries, Populated places, Transportation Network, Hydrology, Hypsography, Population Stats, Humanitarian Profile)	HTTP	Satellite maps, Humanitarian agencies information	2.2, 2.3, 2.15	Datasets used to support the work of humanitarian personnel	Gathering Baseline Info; Assessment; Decision Making; Recovery and Reconstruction
3.3	DaLA	PDF	Data regarding the following: Infrastructure (transport/roads, electricity, water supply and sanitation, and fire, police, and aviation) productive (agriculture and agro-industries) Social (housing, health, and education) Cross-cutting (environment, gender, and disaster risk management)	HTTP	Damages reports, Satellite maps, Humanitarian agencies information and participations, Recovery reports, Projects information, Satellite maps and disaster/recovery information and positions	2.2, 2.3, 2.12, 2.14, 2.15	Methodology, process description and data capture	Gathering Baseline Info; Assessment; Decision Making; Recovery and Reconstruction



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Ref	Name	Content Type	Content	API / Protocol	Possible Required Content	Possible Linked Source	Description	Purpose / Context (PDNA)
3.4	Community Damage Assessment and Demand Analysis Methodology	PDF	Data collected regarding the following: Search and rescue, Evacuation, Protection, Medical and Health, Shelter and Clothing, Food and Nutrition, Water, Sanitation, Livelihood, Lifeline systems	HTTP	Damages reports, Satellite maps, Humanitarian agencies information and participations, Recovery reports, Projects information, Satellite maps and disaster/recovery information and positions	2.2, 2.12, 2.15, 2.3, 2.14,	Methodology, process description and data capture	Gathering Baseline Info; Assessment; Decision Making; Recovery and Reconstruction
3.5	Methodology Rapid Assessment for Humanitarian Assistance	PDF	Data collected regarding the following: General situation of the population, Water, Health situation, Basic and Environmental Sanitation, Food and Nutrition, Geographic Situation, Protection, Shelters, Livelihood, Education, Organization and Coordination	HTTP	Damages reports, Satellite maps, Humanitarian agencies information and participations, Recovery reports, Projects information, Satellite maps and disaster/recovery information and positions	2.2, 2.12, 2.15, 2.3, 2.14,	Methodology, process description and data capture	Gathering Baseline Info; Assessment; Decision Making; Recovery and Reconstruction
3.6	MIRA	PDF	Pre Disaster and Post disaster assessment data (reports) regarding the following: Geographical, Group, Livelihood, Vulnerability, Catchment area, Gender and age, Sector	HTTP	Damages reports, Satellite maps, Humanitarian agencies information and participations, Recovery reports, Projects information, Satellite maps and disaster/	2.2, 2.12, 2.15, 2.3, 2.14,	Methodology, process description and data capture	Gathering Baseline Info; Assessment; Decision Making; Recovery and Reconstruction



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Ref	Name	Content Type	Content	API / Protocol	Possible Required Content	Possible Linked Source	Description	Purpose / Context (PDNA)
					recovery information and positions			
3.7	Inter-Agency Standing Committee	PDF	Assessment data of the situation regarding following: Communities, Institutions, Households, Individuals	HTTP	Humanitarian Organization Information	2.2, 2.9, 2.12	Defines four common units of measurements used in humanitarian needs assessments.	Decision Making
3.8	SPHERE	PDF	Standards regarding Water supply, sanitation and hygiene promotion, food security and nutrition, shelter, settlement and non-food items, health action	HTTP	Health Information Reports	2.2	Defines four standards for humanitarian aid – recommended actions and indicators	Decision Making



6 Information Quality and Levels of Trust

In this section a framework for information quality is presented and an introduction into the basic principles of the levels of trust is given. Thus this section serves as a starting point for the development of a DESTRIERO information reliability framework in D4.2, because information reliability depends on the quality of the information as well as the trustworthiness of the source. This framework will operationalize the given generic approaches in chapter 6.1.1 and 6.1.2 and adopted them to the DESTRIERO environment and the context of humanitarian aid.

6.1.1 A framework for Information Quality and Information Quality Problems

Until the 1990s information quality was equated with the freedom of error. Even when the freedom of error is an important aspect by judging the information quality it cannot be limited to this aspect alone. In the following years information quality respectively data quality was established as an independent scientific discipline. Here you have to take into consideration that the terms information quality and data quality are used alternately and inconsistent in the literature. Although there has been no consensus about the distinction between information quality and data quality, there is a tendency to use data quality to refer to technical issues (e.g., integration of data from disparate sources) and information quality to refer to nontechnical issues (e.g., lack of a cohesive strategy across an organization ensuring the right stakeholders have the right information in the right format at the right place and time) [MADNICK09]. In our case, we do not make this distinction and use the term information quality to refer to the full range of issues.

In the context of humanitarian information management this unification is also helpful since a clear distinction between data and information, which are with semantics enriched data, is often very difficult – what might be data for one stakeholder can be important information for another one. This fact is reflected by the »fitness for use« approach that underlines the importance of judging information quality from the viewpoint of the information consumer. Following this approach information quality can be defined as information that is fit for use by information consumers [WANG96]. In more general information quality can be understood as the degree of how an information product meets its specific requirements [HINRICHS02].

In the middle of the 1990s the MIT did a well-respected survey with information consumers in order to identify relevant aspects of information quality from their viewpoint [WANG96]. Based on the outcome a ranking list of the identified dimensions of information quality was developed. Table 50 provides an overview about the fifteen most relevant dimensions.



Table 50: Dimensions of information quality (Sources: [WANG96] and [ROHWEDER08])

No.	Dimensions of information quality	Explanation
1	Believability	The extent to which data are accepted or regarded as true, real, and credible.
2	Value-added	The extent to which data are beneficial and provide advantages from their use.
3	Relevancy	The extent to which data are applicable and helpful for the task at hand.
4	Accuracy	The extent to which data are correct, reliable, and certified free of error.
5	Interpretability	The extent to which data are in appropriate language and units and the data definitions are clear.
6	Ease of understanding	The extent to which data are clear without ambiguity and easily comprehended.
7	Accessibility	The extent to which data are available or easily and quickly retrievable.
8	Objectivity	The extent to which data are unbiased (unprejudiced) and impartial.
9	Timeliness	The extent to which the age of the data is appropriate for the task at hand.
10	Completeness	The extent to which data are of sufficient breadth, depth, and scope for the task at hand.
11	Reputation	The extent to which data are trusted or highly regarded in terms of their source or content.
12	Representational consistency	The extent to which data are always presented in the same format and are compatible with previous data.
13	Ease of operation	The extent to which data are easily managed and manipulated (i.e., updated, moved, aggregated, reproduced, customized).
14	Concise representation	The extent to which data are compactly represented without being overwhelming (i.e., brief in presentation, yet complete and to the point).
15	Appropriate amount of information	The extent to which the quantity or volume of available data is appropriate.

Like already mentioned above information must fit the needs of the information consumers. This means that an important part of information quality is determined by the subjective perception of the information consumers. As a result information is only used if its quality is subjectively rated as good. This is also reflected in the ranking list above where quality dimensions like believability, value-added, and relevancy have the highest rates.

The importance of the subjective perception also leads to some challenges: Whereas quality dimensions like timeliness or accuracy can be relatively easy rated with information management measures this is not the case for dimensions like believability or relevancy. The rating of those subjective quality dimensions can only be done through a subject at best the information consumer in person.

Based on the presented survey results and additional research [WANG96] finally developed a conceptual framework of information quality. This framework structures fifteen dimensions of information quality into four categories. These four categories are intrinsic, accessible, contextual, and representational (Table 51).



Table 51: Information quality categories and dimensions (Source: [WANG96])

Category	Dimensions
Intrinsic	Accuracy, Objectivity, Believability, Reputation
Accessible	Accessibility, Access security
Contextual	Relevancy, Value-added, Timeliness, Completeness, Appropriate amount of information
Representational	Interpretability, Ease of understanding, Concise representation, Representational consistency

Recently the presented information quality framework was adapted to the humanitarian context by the Humanitarian Data Exchange (HDX) project [TERAN14]. HDX is a project by the United Nations Office for the Coordination of Humanitarian Affairs to make humanitarian data easy to find and use for analysis. The project identified six dimensions as most important for information quality assessments in the humanitarian context.

These six dimensions of quality as they relate to humanitarian information are:

- (1) **Relevance** is determined by whether the data meets the needs of its users. Relevance is defined as the Common Humanitarian Dataset – a set of indicators that can provide an analytic lens into a specific crisis and across multiple crises. This data set can and should be adapted based on user feedback.
- (2) **Accuracy** is the degree to which the data correctly describes the phenomenon it was designed to measure. It is sometimes understood as the margin of error or bias in the estimates.
- (3) **Timeliness** is the delay between when the data is collected and when it becomes available. In humanitarian operations, timeliness is crucial and often the most important characteristic of the data.
- (4) **Accessibility** refers to the ease with which data can be obtained or shared. In humanitarian aid a neutral space where partners can share data – through manual upload or automated processes – for others to use and re-use under specific data licenses should allow easy information access.
- (5) **Interpretability** is the availability of supplementary information that helps analysts understand and interpret the data effectively. Comprehensive metadata can improve the interpretability of a data set.
- (6) **Comparability** refers to the degree to which data can be combined with other data to undertake analysis. An initial set of standards for combining second-mile data, i.e. data that is shared by data collectors with data aggregators should be implemented.

These dimensions can be used as design criteria when developing an information quality framework. In practice the operationalization of the dimensions into measurable and comprehensible indicators is a core challenge. Thereby the context of the application must be reflected in order to provide a practical approach.



Not only information quality can be structured into categories and dimensions but also the resulting information quality problems. According to [STRONG97] three basic information quality problem patterns can be differentiated:

Figure 15: Intrinsic information quality problem pattern ([STRONG97])

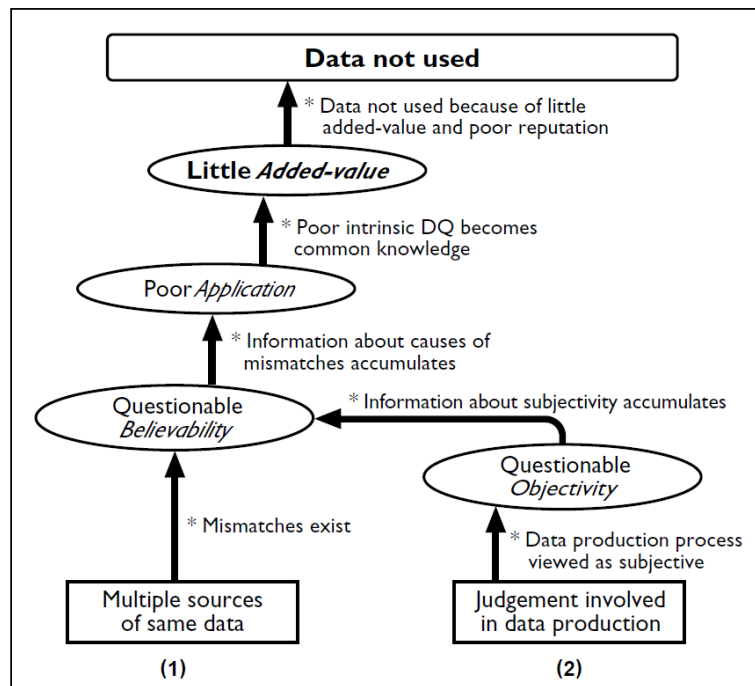


Figure 16: Accessibility information quality problem pattern. ([STRONG97])

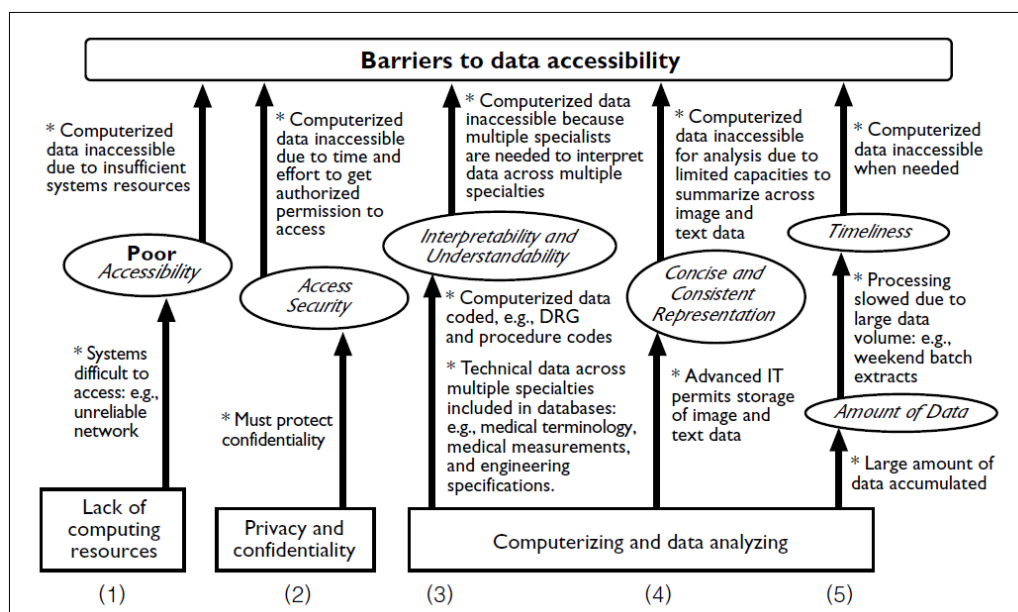
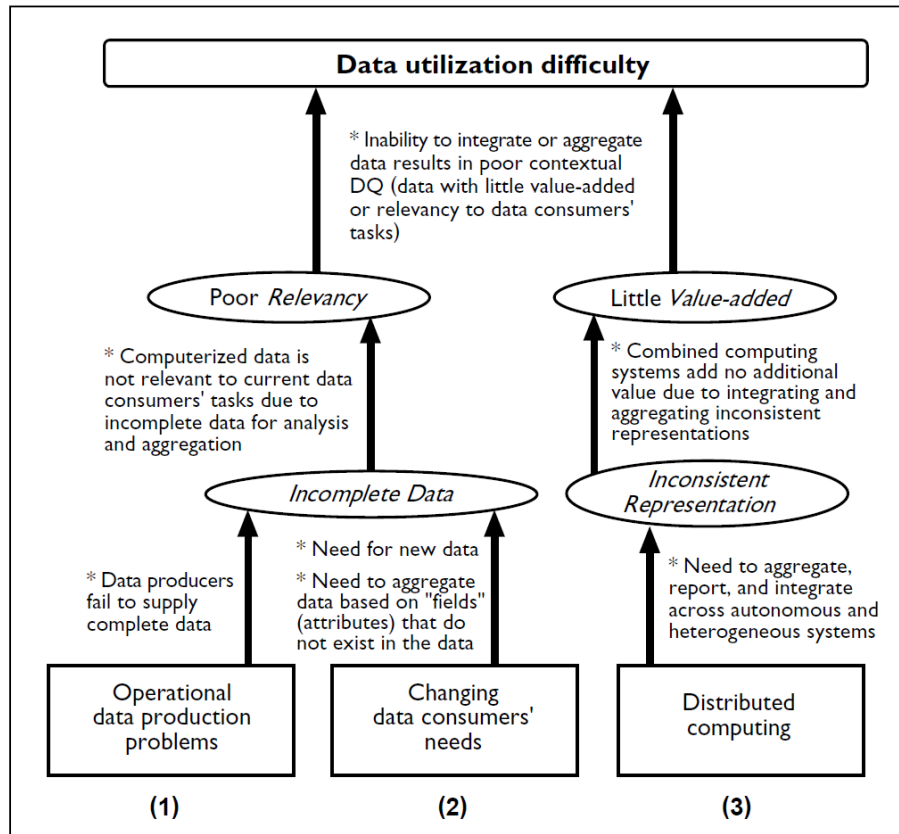




Figure 17: Contextual information quality problem pattern ([STRONG97])



The research discovered that in the analysed cases representational information quality dimensions are underlying causes of accessibility information quality problem patterns and thus not listed as a basic pattern itself. For example this is the case when information is inaccessible to information consumers because it is not in a representation that permits analysis.

Since all findings are derived from business case studies it can be argued that they cannot be transferred entirely to the context of DESTRIERO. Especially in a multinational, multilingual environment like the humanitarian aid with a multiplicity of different organizations (International Organizations, Non-Governmental Organizations, Public Institutions etc.) and the specific challenges (pressure of time, transition of staff and organizations, number of information sources etc.) representation of information in an coherent and comparably way is critical. Thus representational information quality should be kept as an independent information quality problem pattern.



6.1.2 Levels of Trust and basic Principles of Trust Management

The concept of “Trust” is used differently in the discipline of information technology. Originally it derived from social sciences and is defined as the degree of subjective belief about the behaviours of a particular entity. [BLAZE96] first introduced the term “Trust Management” and identified it as a separate component of security services in networks and clarified that “Trust management provides a unified approach for specifying and interpreting security policies, credentials, and relationships.”

In the context of security a trust level can be defined as “an appropriate level of hardware and software protection mechanisms in a computer system based on its intended use, and is established based on a risk analysis that includes a probability and consequence of occurrence of an attack on the system.” [TILBORG11]

Today the fields of application for the concept of trust in information technology are far beyond security. This is because trust is a mechanism for managing the uncertainty about autonomous entities and the information they deal with. As a result, trust can play an important role in any decentralized system. As computer systems have become increasingly distributed, and control in those systems has become more decentralized, trust has become an increasingly more important concept in computer science [LEITE11].

The internet, as the largest distributed system of all, is naturally a target of much of the research on trust. There have, for example, been studies on the development of trust in ecommerce through the use of reputation systems and studies on how such systems perform and how such systems can be manipulated. Another area of concern has to do with the reliability of sources of information on the web. [LEITE11] provides a variety of references for further readings regarding research on trust.

Even when we adopt the concept of trust in the field of information technology it is important to take into consideration the different concepts of trust in other fields like sociology, economics, or organizational management. Thus a multidisciplinary approach can be adopted into the sociotechnical context of DESTRIERO. Table 52 provides an overview of some condensed concepts.

Table 52: Overview of different concepts of trust (Source: [CHO11])

Field	Simplified Concept of Trust
Sociology	Sociological trust is defined as an assessor's a priori subjective probability that a person (or agent, or group) will perform specific actions that affect the assessor. It emphasizes the importance of trust in society as a mechanism for building cooperation among people to extend human interactions for future collaboration.
Economics	Economists distinguish between the personal, informal trust that comes from being friendly with your neighbours and the impersonal, institutionalized trust that lets you give your credit card number out over the Internet. Trust in economics is based on the assumption that humans are rational and strict utility maximizes of their own interest or incentives.
Organizational	In this context trust is defined as the extent to which one party is willing to count on



Management	someone or something with a feeling of relative security in spite of possible negative consequences, emphasizing the possibility of facing risk. Here trust is not necessarily mutual and is not reciprocal. They also define group trust (i.e., between a person and a group or between groups) which is important for dynamic communities of interest.
Communications and Networks	For communication and network protocol designers trust relationships among participating nodes are critical in building cooperative and collaborative environments to optimize system objectives in terms of scalability, reconfigurability, and reliability (i.e., survivability), dependability, or security.

In the next step we try to transfer the presented concepts of trust to the context of DESTRIERO and information management. Thus we can construct a generic trust metric having the following characteristics: (1) trust is based on probabilities and related risks (Sociology); (2) trust can be institutionalized (Economics); (3) trust should be based on each entities interest (Economics); (4) trust is not necessarily mutual and is not reciprocal (Organizational Management); (5) trust is critical for cooperative and collaborative environments (Communications and Networks).

In the literature, the terms trust and trustworthiness seem to be used interchangeable without clear distinction. [SOLHAUG07] explains how trust (i.e., subjective trust level) and trustworthiness (i.e., objective trust level) can differ and how the difference affects the level of risk the trustor needs to take. In Figure 18 the diagonal dashed line is assumed to be marks of well-founded trust in which trust is equivalent to trustworthiness.

Figure 18: Trust levels (Source: [SOLHAUG07])

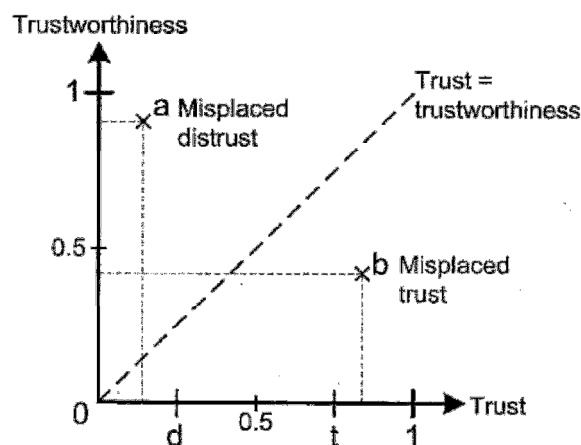


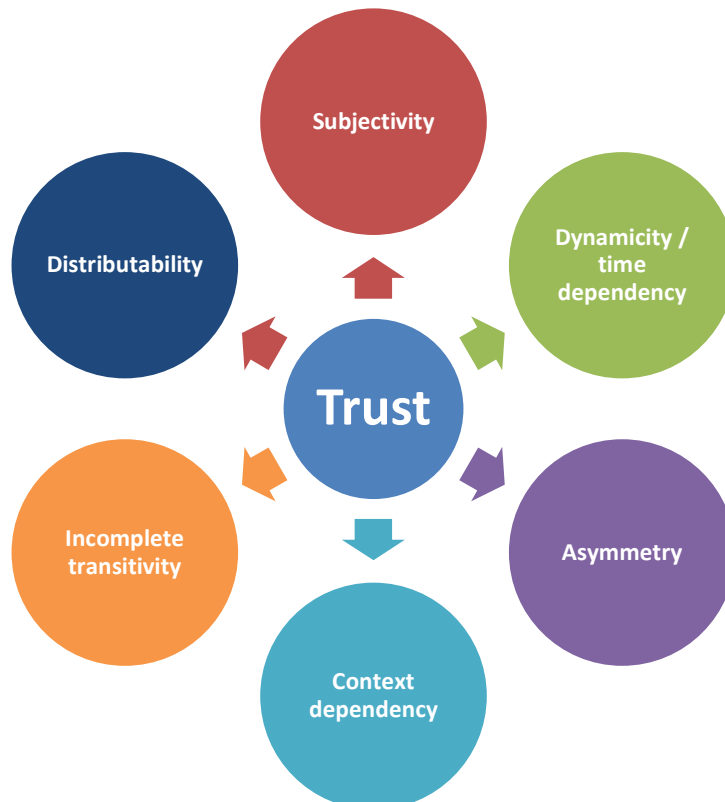
Figure 18 shows two cases of improper trust levels. The first case (a) shows misplaced distrust where the perceived trust is lower than the actual trustworthiness. The second case (b) shows misplaced trust as a result of improper trust estimation. Here the perceived trust is higher than the actual trustworthiness. Transferred to the context of DESTRIERO you can image the case where an organization trusts information e.g. assessment results from a third



party that are in fact in low quality and not reliable (misplaced trust). Also it is thinkable that an organization decides not to use third party data e.g. administrative boundaries for their decision making even when the information is trustworthy (misplaced distrust). The deviation between the actual trustworthiness and given trust can be the result of the uncertainty in the information used as trust evidence.

Due to the unique characteristics of the humanitarian aid and DESTRIERO environments, the concept of trust should be carefully defined. This is done with the reflection of common concepts of trust (see Table 52), the therefrom generic trust metrics, and the working environment of DESTRIERO (e.g. D2.1). The six main properties of trust for DESTRIERO can be summarized as follows (see Figure 19).

Figure 19: Trust properties in DESTRIERO (adopted from [CHO11])



First, trust is dynamic respectively time dependent, not static. This means that trust establishment in DESTRIERO should be based on temporally information and continuously updated. An organization that might be a trustful source might become trustless one day and vice versa. In order to capture the dynamicity of trust, trust should be expressed as a continuous variable, rather than as a binary or even discrete-valued entity. A continuous valued variable can represent uncertainty better than a binary variable.



Second, trust is subjective. In the humanitarian aid different organizations might determine a different level of trust against the same information source respectively organization due to different experiences, policies or estimations.

Third, trust is not necessarily transitive. For example, if A trusts B, and B trusts C, it does not guarantee A trusts C. In order to use the transitivity of trust between two entities to a third party, a trustor should maintain two types of trust: trust in a trustee and trust in the trustee's recommendation of the third party. For example, Alice may trust Bob about movies, but not trust him at all to recommend other people whose opinion about movies is worth considering or not trust other people that Bob recommended as much as she trusts Bob.

Fourth, trust is asymmetric, not necessarily reciprocal. In humanitarian aid, organizations with higher capability (e.g. higher reputation, more experience and staff, better technology) may not trust organizations with lower capability at the same level that organization with lower capability trust organizations with higher capability. As a typical example in organizational management, a supervisor tends to trust an employee less than the employee trusts the supervisor.

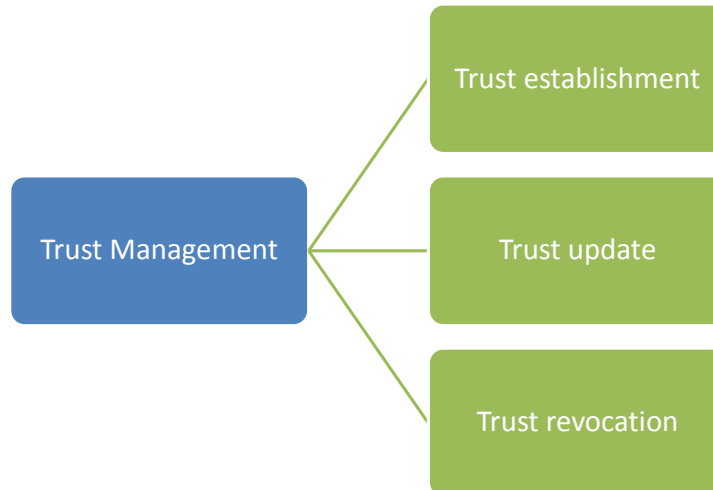
Fifth, trust is context dependent. For example, A may trust B as a water infrastructure expert but not as a nutrition expert. Similarly in DESTRIERO depending on the given task and specific information, different types of trust (e.g. trust in correctness of the given information or trust in integrity) might be required.

Sixth, trust evaluation must be distributed. In the highly dynamic and distributed environment of collaboration during humanitarian aid all organizations should be able to evaluate others independently. Thus a centralized and dominating concept of should be avoided.

In general, the term trust management is interchangeably used with the term reputation management. Trust management includes trust establishment (i.e., collection of appropriate trust evidence, trust generation, trust distribution, trust discovery, and evaluation of trust evidence), trust update, and trust revocation (see Figure 20) [CHO11]. Also, recommendation is frequently used as a way to measure trust or reputation. Recommendation is simply an attempt at communicating a party's reputation from one community context to another.



Figure 20: Definition of trust management (Source: [CHO11])



[ADAMS05] propose three types of reputation systems: positive reputation, negative reputation, and a combination of the two (hybride). Positive reputation systems only consider observations or feedback of the positive behaviours of an organization respectively an information source. Negative reputation systems only record complaints or observations of the negative behaviours of an organization respectively an information source. Peers are assumed to be trusted and so feedback on behaviours is used to negatively reflect an organization respectively an information source reputation. To complement the drawbacks of these mechanisms, hybrid reputation systems have been proposed.



7 DESTRIERO Information Model

This chapter tries to combine information from the deliverable D3.1 “DESTRIERO Data Source Identification Report”, mainly from the ontology described in chapter 5, and from the previous chapters of this document: existing information sources (detailed in chapter 2), existing information structures (detailed in chapter 3), demanded and provided information related to the DESTRIERO platform (detailed in paragraphs 4.1 and 4.2), interoperability aspects (detailed in paragraph 5) and quality and level of trust aspects (detailed in paragraph 6).

The objective is to represent in one model part of the contributions of different partners: AMPER (ontology described in D3.1 chapter 5), AMI, SGSP, PSNI (through ITTI contribution), THALES and E-GEOS for chapter 4, SAADIAN and SESM for the chapter 5 and FHG for the chapter 6.

7.1.1 Presentation of Descriptors to Characterize Information

We can represent information in DESTRIERO context with several descriptors: the domain/cluster associated to the information (Health, Security, Weather etc.), the purpose/context (assessment, decision making etc.), the temporal validity (pre-disaster, post-disaster, after the recovery phase), the source (raw source, primary source or secondary source, source name etc.), the format (email alert, RSS, tweet, API etc.), the trust value (from low to high trust), the quality value (from low to high quality), the type of information (text, image, video etc.), the name, the location.

We propose to details some of those descriptors through two-dimension figures. In those figures, each orange line represents a piece of information, and each figure shows how a set of information can be distributed among the various possible values on each descriptor.

The Figure 21 shows the information distributed among different domains (related to the context, to a sector or to a disaster management task) and different temporal validity (pre-disaster, post-disaster and expected after the recovery phase). Some context data are in relation with elements of the ontology proposed in D3.1 (chapter 5): Population, Facilities, Geographic features (grouped together in “Assets”) and Meteorology (Weather here).

Sectors presented here are frequently used in existing information structures (cf. chapter 3).



Figure 21: Information by Domain and Temporal validity

		Pre-disaster	Post-disaster	After the recovery phase
By Sector	Health	=====	=====	=====
	Education	=====	=====	=====
	Housings	=====	=====	=====
	...			
By disaster management task	Security	=====	=====	=====
	Relief	=====	=====	
	Resources		=====	=====
	Waste	=====		=====
	...			
Context data	Population	=====	=====	=====
	Geographic data	=====	=====	
	Weather		=====	
	Facilities			
	...			

Information is also associated to descriptors in relation with its source (Figure 22). We propose three levels of sources:

- Raw sources;
- Primary sources;
- Secondary sources.

Raw sources are related to some of the sources detailed in D3.1, paragraph 5.2: Sensors, Satellite images. Primary sources are people or organisms on the field that provide parts of information. They can be related to governmental sources (that can be detailed into: local administrations, Police, Fire fighters etc.), NGOs/IOs (Red Cross, AMI etc.) or other sources (associations, individuals etc.). Secondary sources correspond to information sources that are presented in chapter 2 and more generally in newspapers. They put together information provided by primary sources, sometimes in relation with their area (like Health for WHO), in order to provide a partial (or a global) view of the current situation in reports.



Trust level can vary according to the source name and other parameters detailed in 6.1.2 between low trust level to high trust level:

Figure 22: Information by Kind of source and Trust level

		Low Trust Level	Medium Trust Level	High Trust Level
Raw Source	Sensor			
	Satellite image			
	Witness			
	...			
Primary Source	Governmental			
	NGO			
	Other			
Secondary Source	UNOCHA			
	WHO			
	GDACS			
	...			



Figure 23 presents information according to purpose/context and quality level. Information can be related to four purposes/contexts, as proposed in chapter 5 in order to describe information for interoperability needs (gathering baseline info, assessment, decision making and recovery and reconstruction). It can also be of various qualities, as described in 6.1.1.

Figure 23: Information by Purpose/context and Quality level

	Low Quality Level	Medium Quality Level	High Quality Level
Gathering baseline info			
Assessment			
Decision making			
Recovery and reconstruction			

Next figure (Figure 24) shows the information access and the content type. Information access values are “pull” and “push”. On the content type, we propose the following values:

- Unstructured information:
 - text
 - video
 - audio
 - image
 - ...
- Structured information:
 - Numerical or textual value
 - Set of textual/numerical values
 - ...

In paragraph 5, “content type” contains those values: email alerts, PDF, HTML, RSS, Twitter feeds, SMS, JSON, XML etc. In D3.1, Tweets, Facebook messages, audio, video and satellite images are considered as “sources” (chapter 5.2). In Figure 24 we propose another view to characterize the information:

- Information structured and pulled: API, Web Service, XML, JSON, CSV etc.;
- Information unstructured and pulled: PDF, HTML, video, audio, satellite images etc.;
- Information unstructured and pushed: Tweets, SMS, Facebook statuses etc.



Figure 24: Information by Access and Content type

		Push	Pull
Unstructured	Text	=====	=====
	Video	=====	=====
	Audio	=====	=====
	Image	=====	=====
	...	=====	=====
Structured	Numerical or textual value	=====	=====
	Set of textual/numerical values	=====	=====
	...	=====	=====

7.1.2 A DESTRIERO Information Model

We propose to model information in DESTRIERO with the 8 descriptors presented before, obtained through the analysis of existing databases and DESTRIERO partners needs in relation with disaster management:

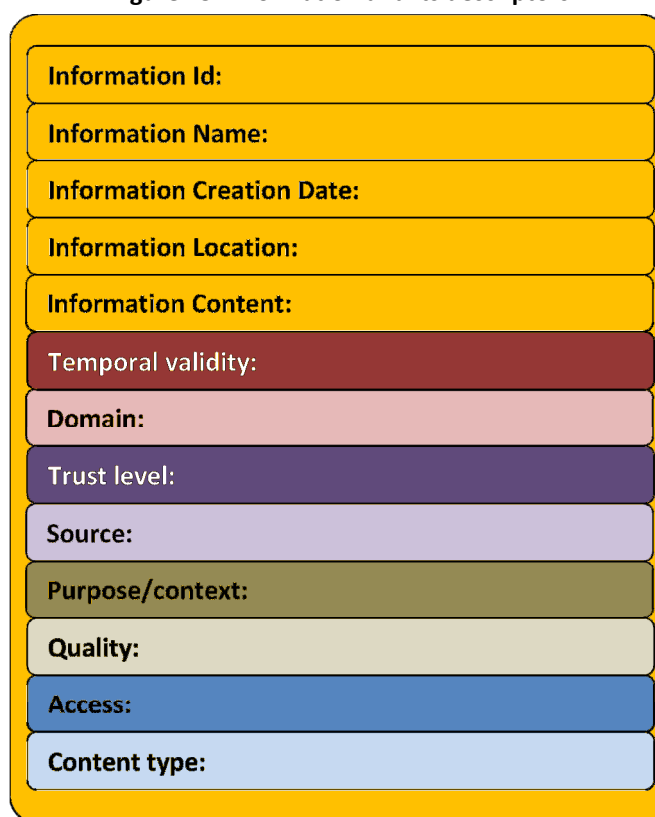
1. Temporal validity
2. Domain
3. Trust level
4. Source
5. Purpose/content
6. Quality
7. Access
8. Content type

This list of descriptors is completed here with the information location (that can be GPS data, country or region name or precise address – cf. geographical features detailed in D3.1, paragraph 5.3.3), and basic database descriptors (id, name, content, creation date). The database descriptors are depending on the used technology and thus are here just exemplified.



Next figure (Figure 25) presents an overview of the identified DESTRIERO Information Model descriptors.

Figure 25: Information and its descriptors



The next tables show examples of the use of such features to describe information in the DESTRIERO context. In these tables, some descriptors (Information Id, Information Creation Date, Information Location and Information Content) are not specified, but in a real use of the model, they must have values.

Information examples in the Table 53, dealing with interoperability aspects, are taken from the paragraph 5 (cf. for WHO 2.2, for ReliefWeb 2.6 and for UNDP 2.14).

Information examples in the Table 54, dealing with end-users needs, are taken from the paragraph 4.1, sub-paragraphs 4.1.1 (Demanded Information by AMI), 4.1.2 (Demanded Information by SGSP) and 4.1.3 (Demanded Information by PSNI).

Information examples in the Table 55: Modules information examples described with the DESTRIERO Model Table 55, dealing with DESTRIERO modules, are taken from the paragraph 4.1, sub-paragraphs 4.1.4 (Demanded Information related to Myriad) and 4.1.5 (Demanded Information related to WebGIS).



Table 53: Interoperability information examples described with the DESTRIERO Model

	WHO	ReliefWeb	UNDP
Name	Health reports (pdf, html)	News (Twitter Feeds)	Human Development Index
Temporal validity	Pre-disaster	Post-disaster	Pre-disaster
Domain	Health	Context	Population
Trust level	High	High	High
Source	WHO Primary source: National statistics	ReliefWeb	UNDP
Purpose/context	Decision Making, Recovery and Reconstruction	Gathering Baseline Information	Assessment, Decision Making, Recovery and Reconstruction
Quality	High	High	High
Access	Pull	Push	Pull
Content type	Unstructured - text	Unstructured - text	Structured – sets of textual/numerical values

Table 54: End-users information examples described with the DESTRIERO Model

	AMI	SGSP	PSNI
Name	Health indicators	maps of evacuated/ abandoned areas	Location of schools
Temporal validity	Pre-disaster	Post-disaster	Pre-disaster
Domain	Health	Context	Education, Facilities
Trust level	High	High	High
Source	Local administration	First responders	Police
Purpose/context	Assessment, Decision Making	Gathering Baseline Info, Assessment, Decision Making	Decision Making
Quality	High	High	High
Access	Pull	Pull	Pull
Content type	Structured – sets of textual/numerical values	Unstructured - image	Structured – sets of textual/numerical values



Table 55: Modules information examples described with the DESTRIERO Model

	Myriad	WebGIS
Name	housings affected by floods	Satellite imagery after the disaster
Temporal validity	Post-disaster	Post-disaster
Domain	Housing	Context
Trust level	Medium	High
Source	First responders	Satellite image providers
Purpose/context	Decision Making, Recovery and Reconstruction	Gathering Baseline Info, Assessment, Decision Making, Recovery and Reconstruction
Quality	Medium	Medium
Access	Pull	Pull
Content type	Structured – sets of textual/numerical values	Unstructured - image

This version of DESTRIERO Information Model can evolve and be more detailed during next steps of the DESTRIERO project.



8 Conclusions

The present document illustrates the existing and demanded information during the different activities of recovery and reconstruction. Mostly international organizations like UNOCHA, WHO, or UNICEF are identified as state of the art information sources in the context of humanitarian relief. This is not surprising since these are the major players in this field and have already established information management principles to address the raising information demands and challenges.

The described information structures are often derived from international methodologies and guidelines like TRIAMS, DaLA, or MIRA. These are originated from lessons-learned from past catastrophes and periodical updated and thus they provide very hands-on advices. Nevertheless since their original scope is not specifically an information structure some abstraction and transformation is necessary in order to apply the included information structures to DESTRIERO.

The outlined information demands by end-users show that their demands are – as expected – driven by their domain and duties. So AMI is looking especially for health information and indicators while SGSP cares more about safety aspects. PSNI asks for information that supports their approach of integrated emergency management. All end-users have in common that post-disaster the demand for timely, accurate and trusted information to inform decisions is of great importance.

The information demands are completed by the two information systems – Myriad and WebGIS – which should be supported by DESTRIERO. Additionally the provided information by the systems is described as well. MYRIAD is a multi-criteria decision analysis tool and methodology developed by TRT. An approach is outlined how Myriad can be used to manage the prioritization of the reconstruction and recovery projects. WebGIS is a platform that provides geospatial mapping tools in order to deliver a shared situation awareness picture. Therefore the information demand and supply regarding pre- and post-disaster information is outlined in detailed.

Chapter 5 provides an in depth analysis of the previous state of the art collections of information sources and information structures. Thus the important attributes (content type, API/protocol, context, etc.) are provided in an easy-to-read table format. This is helpful for adopting the outcome in the next development steps (e.g. information modelling, description of web services, defining the architecture).

The document also provides a framework for information quality and introduces the basic principles of levels of trust. Thus a starting point for the development of a DESTRIERO information reliability framework in the deliverable D4.2 is set, because information reliability depends on the quality of the information as well as the trustworthiness of the source. Therefore in D4.2 the more generic approaches have to be adapted to the



DESTRIERO environment and must be specified in detail to allow its implementation in DESTRIERO.

At the end of the document basic principles for a DESTRIERO information model are given. These consider not only the analysis and outcomes of the present document but also other related deliverables like D3.1. That way it is ensured that the proposed model respects the current status of the DESTRIERO project. A key aspect of the model is how to represent information with descriptors that are obtained through the previous analysis of existing information sources and information structures as well as the information requirements of the end-users. The obtained eight descriptors are: temporal validity, domain, trust level, source, purpose/content, quality, access, and content type.

In summary the present document delivers several fruitful findings that can be picked up in the following work in DESTRIERO. The relevant information requirements in terms of needs and supplies are concretised which is helpful for all following tasks that have to consider these like task 4.2 (Interoperability Information Model) or task 4.3 (Interoperability Information Services). Also groundwork for a profound discussion of interoperability aspects is provided that will be used in the following task 4.2 as well as the information quality framework and the introduced basic concept of trust management. And the basic principles for a DESTRIERO information model serve as a starting point for the architecture design that has to be done in the following work package 5.