

DICOMA: Disaster Control Management



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Report on performed standardization activities

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1 Introduction

This document is an output of WP6 – **Standardization**– and provides a summary about requirements for interoperability for disaster management.

When severe damage occurs in disasters or catastrophes and large-scale public safety is threatened, close collaboration between emergency workers and government agencies is essential. At these times, resources and information – both governmental and non-governmental – must be integrated in order to enable seamless, ad-hoc interaction of otherwise independent, self-organized emergency response units. In such circumstances, collaboration and coordination across organizational and jurisdictional boundaries cannot be achieved without interoperable technologies that are based on standards and arrangements agreed upon in advance.

Interoperability plays a major role in enabling collaboration among government, public safety agencies and their rescue teams to prevent disasters and protect the general public from significant danger in the event of an emergency.

Cutting-edge technology, including applications, devices, and networks, can support public safety departments to prevent catastrophes and respond quickly when one occurs. Mobile technology enables access to, and the exchange of, vital information (1) among emergency response units, (2) between emergency response units and the affected public, and (3) among the affected public. This is possible regardless of where emergency personnel reside.

Furthermore, new technologies are not restricted to voice; information in the form of video and data from heterogeneous, public and private sources can be integrated to provide emergency response units with a better understanding of the situation and the scale of the disaster. Ultimately, this access to real-time information can save lives.

The DICOMA project focuses on software design, development and integration in order to support control and management of crisis and disasters.

The main goal for DICOMA project is to provide better tools for disaster control management. Disasters like earthquakes, forest fires, massive storms and floods are far beyond the ability of a single agency to deal with, and require cooperation between multiple agencies.

A standardization plan has been carried out in this project. This study plan has been developed in two directions. Firstly, the identification of existing standards, the standardization bodies, the committees and the recommendations have been fixed in the requirements of DICOMA. Secondly, identification of critical technologies and protocols requiring specific standardization actions.

2 Summary about requirements for interoperability for disaster management

Interoperability refers to “the ability of two or more entities or systems to exchange information and to use the information that has been exchanged” (IEEE 1990). Interoperability resides at the interplay of human systems, business processes, and enabling technologies.

Prior studies have explored interoperability issues in a wide variety of domains, including heterogeneous databases, information retrieval, knowledge systems, artificial intelligence, multimedia, geographic information systems (GIS), interoperable system architecture design, and business process modeling. Take heterogeneous databases for example. Interoperability has been explored within the context of federated databases, data warehousing, integrating databases and ontology.

Supports for interoperability range from methods, meta-models, concrete models, to operational standards. Specially, the design of interoperability support should not only address the communication interactions and the data structures, but it should also address the vocabularies to be used when populating the data structures. However neither of these studies deals with critical incidents nor uses a theory like (e.g., Activity Theory) to guide the approach.

The synergy achieved by integrating all management modules increases the effectiveness of the system and facilitates decision making of the operator and the dispatcher.

There are three approaches for interoperability: integrated, unified, and federated. As previously shown, there is no general agreement on using the same evacuation terminology by local disaster management groups. There is no obligation for the district and local group to use the same terminology as each other or state group. To analyse the problem, one must consider two important features of disaster events: time shortage and complexity.

The federated approach needs enough time for negotiation and also the presence of multiple formats increases complexity. Therefore, the authors propose the use of a unified approach to eliminate these issues.

The unified approach needs advance negotiation to reach agreement on semantic, technological, and organizational interoperability requirements. Some people argue that the unified approach requires the disaster management organizations to spend time together in order to reach agreement on conceptual interoperability issues.

2.1 Interoperability barriers

In the Queensland Floods Commission of Inquiry report (2011), it indicates that using different activation level terminologies led to confusion in the disaster management system during the 2011 Queensland floods (disaster management teams use „activation levels” to explain their status during different times of disaster e.g. „alert”, “lean forward”, “stand up” and “stand down”). For example, using different activation level terminologies by a Bundaberg local group in a teleconference with other disaster management groups led to confusion. Inconsistency in

information may make it unreliable, and inconsistencies in warning message content may lead to delays in action. Consistency in the level of risks terminology and tone of warning message is critical. The message must be consistent in the way it conveys information about the level of risk, and the tone in which it is given. This exemplifies a semantic interoperability problem, concerned with using the same meaning of the vocabulary. Note that one aspect of semantic interoperability is concerned with the various understanding by people of the same concept. During the 2011 Queensland Floods drivers ignored road closure signs and continued to drive on flooded roads (Queensland Floods Commission of Inquiry, 2011).

As different people have different conceptions about the danger of driving on flooded roads, educating people during the preparedness phase would reduce the issues about people having different preconceptions. Conversely, the researchers believe that overusing danger signals may condition the public to ignore important warnings in the future.

2.2 Interoperability concepts

Communication (data interoperability) between entities is an essential characteristic of interoperability. For example, a disaster management system “depends on the flow of information between the local, district and state disaster management groups” (Queensland State disaster management plan, 2011). The local groups are in the front line of disaster response and if they do not have effective communication with the district group the disaster response would be ineffective (Queensland Floods Commission of Inquiry, 2011).

There are some examples of poor communication during the 2011 Queensland Floods. For example, the state level of Queensland sent resources to the region without consulting with the local group. Another example was sending the emergency message to the state group without informing the local group (Queensland Floods Commission of Inquiry 2011). Consequently, people in some areas did not receive the warning message in time, and this led to two deaths at Spring Bluff and two deaths at Murphys Creek (Queensland Floods Commission of Inquiry, 2011). During the 2011 Queensland floods, failures in communication made the disaster response less efficient in the Somerset region, with the Somerset local group losing communication with the district group for two days (Queensland Floods Commission of Inquiry, 2011).

Acknowledging that is a disaster situation it can be expected that sometimes there will be loss of communication, therefore, as a design principle, if one or several participants in a disaster situation cannot continue to accomplish their functions, the rest should be able to continue effectively. As a consequence, in a situation where participants face communication loss they should be able to continue to function effectively. The above examples illustrated the importance of improving data interoperability in disaster management systems

2.3 Emergency Management Information System (EMIS)

The feasibility study of Emergency Management Information System (EMIS) was formulated in the early 2005. Information system is assessed from different viewpoints including:

- **Hierarchy** – there exist 3 main levels of EMIS – central, regional, and local with different roles in emergency situations.

- **Organization** – processes, methods, and scenarios are analyzed. It is also an important integration component for bridging the EMIS with other systems.
- **Data and technology** – describes EMIS on the conceptual level and technologies used. The main building stones of the proposed architecture are secured communication infrastructure and service oriented architecture (SOA) based on the web services concept.

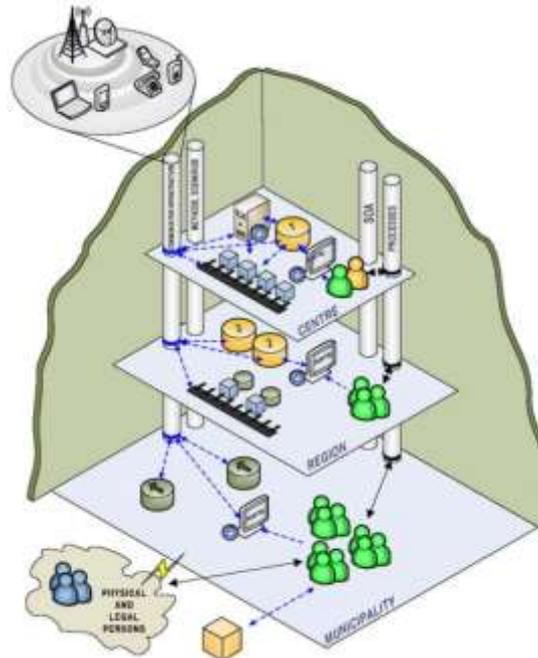


Fig. 1 – Proposed general architecture of EMIS

General architecture of EMIS is shown on figure 1. EMIS is proposed as a modular system based on interrelated modules.

Three trends in contemporary societies make innovation in privacy protection in Emergency Management Information Systems an important issue:

- **Interoperability** – Difficulties in communication, coordination and collaboration in disaster response have inspired calls for enhanced interoperability and support for the assembly of flexible ‘systems of systems’ for emergency response
- **A digital ‘tsunami’** – a term coined by an EU Commission ‘Future Group’, who observe how people’s (and objects’) attributes, actions, and movements are increasingly mapped, tracked and interrogated for commercial, social, and security purposes. Individuals contribute to the proliferation of personal data through self-disclosure, e.g. in social media networks. Together with innovations in data analysis and visualization, this has resulted in a ‘tsunami’ of digital personal data (Future Group, 2007).
- **Fear of ‘big brother’ surveillance** – there is increasing awareness and fear of privacy intrusion and anxieties related to personal data processing and surveillance.

Advanced information and communication technologies (ICT) have the potential to enhance personal data processing capabilities for emergency response, aiding the development of better,

more efficient and economical services. Emergency management information systems (EMIS) try to leverage this potential. However, how societies and their institutions and organizations handle, and how individuals can control, personal data are highly sensitive and consequential matters, deeply entangling security, privacy and liberty with technological potential. Data protection laws, legal risk analysis methodologies, privacy protection practices, policies and technologies are being developed to manage risks and opportunities for individuals, groups, and society as well as professional responders.

2.3.1 Identification of Stakeholders in Emergency Logistics

For each type of crisis, there is a chain of stakeholders necessary to manage a crisis in order to fight against it. This section identifies the different stakeholders involved in Emergency Logistics.

We identified primary intervention stakeholders as the ones that intervene first during a crisis (for example fire fighters and police officers are primary stakeholders in crisis management and perform on-site assessment of the situation. In addition, we identified a number of secondary stakeholders that can be added to the primary intervention stakeholders, while fighting a crisis (for example inspectorates are secondary stakeholders, since they do not have a task in primarily managing a crisis, but need to investigate the situation for evaluation purposes at an early stage).

We have developed this section using the example of Dutch, Spanish and German stakeholders. The reason is that, in general, these situations are resolved in the same way in most of the countries and with very similar stakeholders.

Below we present the different stakeholders Emergency Logistics that play a role during the types of crises selected in chapter 3 (Step#1). First we present the stakeholders at the First Responder and 2nd level to combat an incident, second we present the stakeholders at the management level to fight against the crisis (1st level). Finally, we present a table with the intervention of each stakeholder in the different scenarios of DiCoMa.

2.3.1.1 Stakeholders at Operational and Tactical level

Primary intervention First Responders:

Fire Department

In times of crisis the fire department fulfils an important task. The Commander in Chief of the fire brigade is in charge of control of the disaster. Everything that happens at the disaster site is under his authority. The main task of the fire department during a disaster is to rescue people. The commander of the fire brigades coordinates activities with the other emergency services.

Medical teams

Medical assistance is provided to anyone who is injured in a disaster (even mentally). In every European country, ambulance services take care of medical assistance. In the Netherlands, the

Medical Assistance in Incident and Disasters (GHOR) is concerned with first aid and hospital transport by ambulance. The head of the GHOR in the region will participate in the team of the Safety Region during a regional disaster as well. In Spain, the Emergency Medical Services are the responsible of the medical assistance in a crisis. French emergency medical aid is managed by SAMU (Service d'Aide Médicale d'Urgence – Urgent Medical Aid Service). On the field, emergency medical services are under the commandment of firefighters. SAMU intervenes for a variety of cases from simple medical care (first aid) to pre-hospital assistance. A triage physician regulates the care resources (from an ordinary ambulance to mobile intensive care units managed by the SMUR (Service Mobile d'Urgence et de Réanimation – Intensive care and Emergency Mobile Service)) and sends patients to adapted services.

Police

During a disaster, the police have to ensure that fire and ambulance services can fulfil their tasks. They can provide help by managing traffic or setting up a safety zone around the disaster area. Also, in case of an intentional crisis, they have to investigate the crime scene.

Secondary intervention:

SWAT

Teams for Special Weapons and Tactics are a special service of the police force. They act for instance during hostage-taking or other special requests from the police. Every European country has special police teams. In the Netherlands, the Assault Team (AT) is armed more heavily than the normal police forces. The Grupo Especial de Operaciones (Special Group of Operations), commonly known as GEOs, are the Special Operations Forces of the Spanish Cuerpo Nacional de Policía. Organised along the lines of many other special counter-terrorism units throughout Europe, the GEO is focused on dealing with terrorist attacks, including aircraft hijackings as well as maritime threats and hostage taking. The GEO can also be used in a support role for Spanish Police operations outside the realm of terrorism, and is active in protecting visiting heads of state and providing security for high-profile events. The GSG 9 der Bundespolizei (GSG 9 of the Federal Police) is the elite counter-terrorism and special operations unit of the German Federal Police. In France, multiple groups exist: the GIGN (Groupe d'Intervention de la Gendarmerie Nationale – National Gendarmerie Intervention Group) which is part of the National Gendarmerie (Ministry of Defence), a specific police force from the French army, the GIPN (Groupe d'Intervention de la Police Nationale – National Police Intervention Group) which is part of the National Police (Ministry of Interior), and the RAID (Recherche, Assistance, Intervention, Dissuasion – Research, Assistance, Intervention, Deterrence), a more heavily armed force than GIPN. The competence domain of each group depends on emergency types and geographical area.

Inspectorates

Inspectorates (such as the Labour Inspectorate, Youth Care Inspectorate, Inspectorate for public Health) might request for information during a crisis. They need this information to investigate whether all the requirements are fulfilled. In the Netherlands, for instance, the Labour Inspectorate supervises over the compliance with rules and regulations across the whole range of Social Affairs and Employment.

CBRN (Chemical, Biological, Radiological, Nuclear) units

CBRN units can provide help in case of chemical, biological, radiological or nuclear incidents. CBRN units can provide passive protection, contamination avoidance and CBRN mitigation. During a disaster, chemical engineers can measure if hazardous materials are harmful for public health. The Dutch and French Fire Brigades have special teams in chemical protective suits, which can be deployed in times of nuclear incidents. In Spain the National Police and the Spanish Civil Guard have their own Nuclear, Radiology, Biology and Chemistry NRBQ (in Spanish = Nuclear, Radiológica, Biológica y Química) units. Also, the Military Emergencies Unit and emergency services have CBRN training in Spain. Police, Fire and Ambulance services in the UK must all have some level of CBRN providers. Within the ambulance service this is performed by the Hazardous Area Response Team (HART) and Special Operations Response Team (SORT). Since the introduction of new equipment to UK fire services under the New Dimension programme, sometimes referred to as the New Dimension or New Dimensions that was started by the Department for Communities and Local Government in the UK, for fire and rescue services in England and Wales, following the 2001 terror attacks. It has provided equipment, training and standardized procedures to deal with terrorist attacks and major environmental disasters.

CBRN decontamination of personnel (including members of the public) has become a task carried out by fire services in the UK and they regularly train for such scenarios.

Army units

Army units can also be involved in crises and emergency response operations. The brigades can provide military support, during evacuation or they can also lend support to social organisations. The Netherlands have around 4.600 soldiers which are able to help during disasters. The Royal Netherlands Army works together with municipalities, police, fire brigades and medical services. The German Armed Forces (Bundeswehr) can also be deployed for disaster relief operations by the suggestion of Federal Office of Civil Protection and Disaster Assistance (BBK) crisis committee. In Spain, the Emergency Military Unit is a joint force which has the mission of intervention anywhere in Spain in cases of serious risk, catastrophe, calamity or other public needs. In France, the Head Office of Civil Security and Management Crisis (DGSCGC – Direction Générale de la Sécurité Civile et de la Gestion des Crises), which depends on the Ministry of Interior, is a civil defense agency employing militaries. Among the resources of the DGSCGC, military detachments (about 1500 persons) are specialized to intervene on forest fires, and crises from technological and natural risks.

Bomb squad

In the Netherlands, the Explosive Ordnance Disposal Service (EOD) is responsible for detecting, identifying and disposing of conventional and improvised explosives. This task might be important during intentional crisis, for instance when the EOD has to investigate suspicious packages. Specialist in explosive ordnance disposal (TEDAX) is the specialists in Spain whose business is the neutralization, deactivation and involvement bombs and conducting studies and reports (surveys) thereof. There are TEDAX units in Civil Guard and the National Police. In France, the DGSCGC has a specific department of bomb squads, which intervene everywhere except on

military sites and ports. Paris and its region have its specific bomb squad from the Police Prefecture. Collaboration with the French army happens when necessary.

Forensics

In the Netherlands, the National Forensic Institute (NFI) provides services within the criminal justice chain. For instance, police and the Public Prosecution Service might ask for forensic services during a crisis. The NFI advises on the securing of evidence and examines the evidence at crime scenes. In Spain, the National Institute of Toxicology and Forensic Science is a body under the Ministry of Justice whose role is to "assist the administration of justice and contribute to the unity of scientific criteria and the quality of the analytical expertise and the development of science forensic".

Construction inspectorates (Municipality)

Building inspectors inspect the structural quality and general safety of buildings. During disasters it is important to maintain the quality of buildings since they might collapse. Also, they can advise about the usage of highways, streets, water systems. Their main task is to ensure that buildings comply with building codes and ordinances.

2.3.1.2 Stakeholders at strategic level

Stakeholders at the top level of management of the emergency can be very diverse. At a minimum all organization mentioned in paragraph 3.1.1 can be related to and/or be part of this level during a crisis. In addition, we identified a number of stakeholders that can be added to the top level network during a crisis.

National Government

The National Government in the Netherlands is concerned with the overall crisis structure in the Netherlands. During a crisis of national interest, the National Crisis Centre (NCC) will coordinate between different ministries. Besides, the crisis communication at the national level is provided by the National Crisis Communication Centre (NCCC). The structure of national government involvement differs per country. For example, in Spain, the Ministry of Interior is the main responsible for national emergencies and the highly decentralized autonomous regions are responsible for the first response, coordination of the rescue efforts, evaluation and preparedness works if the case is not a national emergency. In France, when national response or national involvement is required, it is managed by the COGIC (Centre Opérationnel de Gestion Interministérielle des Crises – Operational Centre of Inter-ministry Crisis Management); this center, under the Ministry of Interior, informs the ministry cabinet, prepares and coordinates actions with national means.

Ministries

Within The Netherlands, each ministry has its own Departmental Coordination Centre (DCC) which cooperates with the National Crisis Centre in times of emergency of national significance. The DCC is the coordinator of the ministry and is a collaboration of different policy fields, communications, process control and operational support emergency.

The Ministerial Committee for Crisis management (MCCb) acts in times of an interdepartmental crisis. The prime minister decides upon the composition of the Committee. The MCCb advises the ministers and is concerned with for instance the political consequences of future decisions.

The structure of involvement of ministries at the 1st management level differs per country. For example, in Spain General Directorate for Civil Protection and Emergency (Dirección General de Protección Civil y Emergencias, DGPCE) is the national center for emergency management studies under the Ministry of Interior. DGPCE is responsible for preparation of national civil protection plans, simulation of those plans nationally or regionally, implementing risk analyses, building risk structures and planning, training of citizens and volunteers against disasters, building and suggesting necessary infrastructure for mitigation and preparedness efforts, and finally coordinating, requesting help of international emergency management organizations and/or Military Units in Spain if necessary. In UK, as a response to the need of a central governmental agency, The Civil Contingencies Secretariat (CCS) in the Cabinet Office was established in July 2001.

Safety Region

For example, in the Netherlands consists of 25 Safety Regions in which the medical services, police, fire brigade and municipalities cooperate at the regional level. Each Safety Region consists of several municipalities and the mayor of the largest municipality is chairman of the Safety Region. In times of crises, the board and members (all the relevant crisis partners) of the Safety Region meet in order to take decisions at the strategic level.

Local government

At the local level, the mayor is responsible for the crisis response effort. Each municipality has a Local Policy Team (GBT). First, the GBT has to take strategic decisions (e.g. about evacuation). The GBT cooperates with medical services, fire brigade and police. Besides, the GBT also is in charge of communication to their inhabitants and the public concern (primary needs, shelters, etc.). The mayor is the commander in chief and many Dutch or Spain municipalities have an official who is concerned with disaster management. In France, the first level is also the mayor. Then, at the department level (95 departments in Metropolitan France), the prefect is the director of rescue operations; at the zone level (7 zones in Metropolitan France), it is the zone prefect who is in charge of the rescue operations.

Hospitals

Hospitals are an important crisis actor for the medical services. In the Netherlands, the Medical Assistance in Accidents and Disasters (GHOR) makes an “injured dispersion plan” which provides an overview of the capacity of hospital in the region. Hospitals, thus, have to provide information with regard to capacity of staff and material.

In France, each hospital (private or public) has an emergency plan, named “white plan” (Plan Blanc) activated by the hospital manager in case of massive flux of victims, epidemics, or long climatic event such as a heatwave.

Public Prosecution Service

The Public Prosecution Service is involved in solving criminal cases and maintaining the legal order. The Public Prosecution Service is part of the judiciary (together with the courts). The judiciary is responsible for the administration of justice. Crisis may have intentional causes and in this case, the Public Prosecution Service is an important partner for the police and Safety Regions.

District water board

Water boards are concerned with the management of water resources, dams and waterways. They fulfil a role during emergencies as water pollution and block shipping, accidents involving toxic materials, floods and extreme weather conditions. In the Netherlands, water boards are regional government bodies. As of 2011, there are 25 Dutch water boards. In Spain the Ministry of Environment is in charge of water resources management and the Ministry of Health is in charge of drinking water quality monitoring. Basin Agencies (Confederaciones de Cuencas Hidrográficas) are in charge of planning, constructing and operating major water infrastructure such as dams; elaborating basin plans; setting water quality targets, as well as monitoring and enforcing them; granting permits to use water, as well as inspecting water facilities for which permits were granted; undertaking hydrological studies; and to provide advisory services to other entities at their request. Basin Agencies are headed by a President who is nominated by the Cabinet at the proposal of the Minister of Environment. Each agency has a Board, a user assembly and a council to ensure broad participation by various stakeholders in its decision-making process, both in planning and operations.

Electricity companies

Electricity companies have a stake during crisis as well. For example, a power outage can lead to hazardous traffic situations and needs to be fixed by the electricity operator. Nuon and Essent are energy companies in the Netherlands which supply gas, electricity, heat and cooling .

Some companies in Spain are Iberdrola and Union Fenosa.

And a German energy company is EON.

Security companies

Private companies are increasingly engaged in the field of crisis management. This ranges from corporate security companies to private security guards. During festivals and other events, private security companies have to cooperate with other authorities (for example police) with regard to incidents.

ICT support companies

ICT support companies not only provide support during cyber-crisis (such as the infection of computer networks with Botnets), one might also think about problems with communication between different rescue services. For instance, when problems occur with C2000 (a communication network for police, fire fighters and ambulance services), the Network Management Centrum needs to monitor and control these problems. At the local level ICT companies have a task regarding the functional management of radio control systems and devices .

Transportation services

In times of emergency, transportation services can support rescue services by managing the (public) transport. ProRail, for instance, is the Dutch rail infrastructure manager, which can support fire fighters in incidents involving hazardous material on tracks.

In Spain ADIF plans and directs Management System Traffic Safety ensuring compliance with its mandated activities in the Railway Sector Act and the implementing regulations. The aim is to achieve safe and efficient railway operations implementing continuous improvement processes and zero tolerance of risk levels.

The Ministry of Infrastructure and the Environment in the Netherlands also has an organization with regard to transport incident management. The Inspection Environment and Transport (ILT) is concerned with incident management related to nuclear transport, waste transport, etc.

Pharmacies

Pharmacies provide pharmaceutical care and can play a vital role in crisis prevention as well as response. Especially in times of an (epidemiologic) health crisis, pharmacies can inform patients and provide them crucial services.

Public works departments

The Dutch Ministry of Infrastructure and the Environment oversees connections by road, rail, water and air, and protects against flooding. It also promotes the quality of air and water. Rijkswaterstaat, for instance, is the executive arm of the ministry. It is responsible for the design, construction, management and maintenance of the main infrastructure facilities in the Netherlands. During crisis, Rijkswaterstaat has to cooperate with other authorities (such as provinces and municipalities) to ensure the smooth flow of traffic and water.

In other countries it's different. For example, in Spain there are a Ministry of Infrastructure and other Ministry of Agriculture, Food and Environment. The first oversees connections by road, rail, water and air, and the second oversees the managing flood risk as well as aspects relating to the safety of safety of dams and reservoirs .

Public health agencies

Public health agencies work to ensure the health of all residents. They also provide information on public health. The national public health agency in the Netherlands is the National Institute for Public Health and the Environment (RIVM). It is concerned with the prevention and management of incidents and disasters. RIVM plays an advisory role during the event of disaster and is

responsible for providing accurate information, measurement data and model calculations with the aim of limiting the consequences to human health and the environment. Thus, the RIVM plays a key role in providing knowledge and information to response organizations.

On a local (municipal) level, the Dutch Public Health Department (GGD) is concerned with the following sections: epidemiology, social services and health promotion, public (incl. mental) health care (which regulates the care for houseless, illegal people and drug addicts), infectious disease control and ambulance care.

In Spain, the Public health agency is the Ministry of Health, Social Services and Equal. The Ministry proposal and implementation of government policy on health, planning and health care and consumer products, and the exercise of the powers of the Central Government to ensure the citizens the right to health protection.

2.3.2 Selection of European stakeholders for Emergency Management and Logistics

This aim of this section is to identify the stakeholders and projects involved in Emergency Management and Logistics in Europe. The output of this section will be used to determine which stakeholders can be involved together with the DICOMA system in a Pan-European Emergency crisis scenario.

The first subsection is a summary about the crisis actors in Europe. It describes the role of each stakeholder and how European stakeholder organizations are involved in an Emergency Event. The next subsection focuses on the stakeholders involved in Emergency Logistics but focusing on those active in operations, coordination, decision making, infrastructure deployment, etc.

2.3.2.1 Basic information about the crisis actors in Europe

This subsection explains how crises are managed within the European Union.

In general, any crisis or emergency is managed by the Ministry of Interior of the nation or by the Ministry of Defence (like in Sweden, Denmark or Republic of Ireland). Usually, within the Ministry of Interior, the responsibility for civil emergency planning is handled by Civil Protection division. In these cases, there are one or more institutions within the Ministry of Interior that carry out all the management of a crisis situation or a risk emergency.

In some countries, the action of the Civil Protection is carried out by other institutions. For example, in the Netherlands, within the Ministry of Interior there is other institution called National Crisis Centre (NCC). Also, there are some entities within the Ministries that work in these situations, like “Emergency Military Unit” in Spain that is a special unit military which acts in emergencies for both domestic and foreign situations.

On the other hand, there are a lot of NGOs that work in risk and emergency management. For example, we can find the “International Federation of Red Cross Red Crescent Societies” or “Médecins Sans Frontières”. NGOs work in places that are in an emergency situation. Also these kinds of organizations work in many countries, including countries outside Europe.

For a summary of all the stakeholders in European Union reference [4] can be consulted.

With regards to how these stakeholders act, as soon as a disaster occurs, a disaster management team is formed. This consists of the local mayor and representatives of the fire service, medical and municipal services, the police, the army and other public services. The team takes key decisions on how to respond to the disaster. The roles and responsibilities of each of the parties represented depend of the country in which the emergency occurs.

Basic information about the crisis actors in the Netherlands can be retrieved from:

<http://www.government.nl/issues/crisis-national-security-and-terrorism/who-does-what-in-a-disaster>

Concerning France, information is available at:

http://www.interieur.gouv.fr/sections/a_l_interieur/defense_et_securite_civiles/presentation

and related web pages, taking into account the role of the ESOL (Etablissements de Soutien Opérationnel et Logistique – Operational and Logistics Support Organizations), detailed at:

http://www.interieur.gouv.fr/sections/a_l_interieur/defense_et_securite_civiles/administration-logistique/esol

2.3.2.2 Selection of the main stakeholders for Crisis Management

This section shows a list of the most important European stakeholders for Crisis Management. It lists the most general stakeholders operating in Europe and some others operating in at national level. Also, it includes the most important international stakeholders. In summary this section identifies the selection of the stakeholders involved in Emergency Logistics

Besides these stakeholders, the list presented in chapter 4 should be taken into account as stakeholders at a national level.

Nº	Organizations	Contact details / Web
1	European Union Satellite Centre (EUSC)	www.eusc.europa.eu
2	Red Helmet Foundation (Casques Rouges)	http://www.casques-rouges.org
3	United Nations Office for the Coordination of Humanitarian Affairs (OCHA)	Suha Ulgen Technical Coordinator Field Information Services Unit (AIMB) United Nations Office for the Coordination of Humanitarian Affairs (OCHA) Tel: +1-917-367-9005 Mobile: +1-646-334-5021 Email: ulgen@un.org Web: http://www.unocha.org/

4	Red Cross EU Office IFRC's (International Federation of Red Cross Red Crescent Societies)	www.redcross-eu.net
5	Monitoring and Information Centre - MIC	http://ec.europa.eu/echo/policies/disaster_response/mic_en.htm
6	EU monitoring systems (ARGUS) ARGUS: a general European rapid alert system.	http://ec.europa.eu/health/preparedness_response/generic_preparedness/planning/argus_en.htm
7	EADRCC: Euro-Atlantic Disaster Response Coordination Centre.	http://www.nato.int/eadrcc/index.html
8	European Community Humanitarian Office (ECHO)	http://ec.europa.eu/echo/about/presentation_en.htm
9	Medecins Sans Frontieres	http://www.msf.org
10	Protection Civile Sans Frontières	http://www.ong-pcsf.org
11	Pompiers Sans Frontières	http://www.pompiers-sans-frontieres.org/
12	International Maritime Organization	http://www.imo.org/Pages/home.aspx
13	International Civil Defense Organization	http://www.icdo.org
14	European Centre for Disease Prevention and Control (ECDC)	http://www.ecdc.europa.eu/en/Pages/home.aspx
15	Secretariat of the International Strategy for Disaster Reduction (ISDR)	http://www.unisdr.org/
16	Federal Office of Civil Protection and Disaster Assistance (BBK-Bundesamt für Bevölkerungsschutz und Katastrophenhilfe) (Germany)	http://www.bbk.bund.de/EN/Home/home_node.html
17	Technisches Hilfswerk (Federal Agency for Technical Relief, THW)	http://www.thw.de/EN/Homepage/homepage_node.html
18	German Committee for Disaster Reduction (DKKV)	http://www.dkkv.org/

19	Deutsche Gesellschaft für Technische Zusammenarbeit (GIZ)	http://www.giz.de/
20	Unidad Militar de Emergencia (Spain)	http://www.ume.mde.es
21	General Directorate for Civil Protection and Emergency (Dirección General de Protección Civil y Emergencias, DGPCE) (Spain)	http://www.proteccioncivil.org/
22	The Civil Contingencies Secretariat (CCS) (UK)	http://www.cabinetoffice.gov.uk/content/civil-contingencies-secretariat/
23	The Disasters Emergency Committee (DEC) (UK)	http://www.dec.org.uk/
24	Office of Emergency Planning (Republic of Ireland)	http://www.emergencyplanning.ie/
25	DZSU National Protection and Rescue Directorate (Croatia)	http://www.duzs.hr/
26	The Danish Emergency Management Agency - DEMA (Denmark)	http://brs.dk/eng/Pages/dema.aspx
27	Estonian Rescue Board	http://www.rescue.ee
28	National Directorate General for Disaster Management (NDGDM) - Hungary	http://www.katasztrofavedelem.hu/
29	The Luxembourg Rescue Services Agency (Administration des services de secours - ASS)	http://www.emergency.lu/

Table 1: List of main stakeholders identified in Europe

1/ European Union Satellite Centre (EUSC)

The European Union Satellite Centre (EUSC) is an Agency of the Council of the European Union dedicated to the exploitation and production of information derived primarily from the analysis of earth observation space imagery in support of Union decision-making in the field of "second pillar", the Common Foreign and Security Policy (CFSP).

The European Union Satellite Centre and receives requests from its users, the European Union member nations, to gather all types of thematic information available about a given area of interest in the world. The EU Satellite Centre provides geospatial products resulting from the analysis of satellite imagery and collateral data in order to support the operations and missions of the European Union and its Member States

2/ Red Helmets Foundation (Casques rouges)

Created in 2006 the Red Helmets Foundation is making the humanitarian action easier. The Foundation has two main aims. The first is to obtain the creation of Red Helmets at the UN: this new force would be created under the aegis of the UN. Those humanitarian brothers to the Blue Helmets would be composed by a High Command and by an operational force able to act at anytime. Therefore, the Red Helmets could be dispatched during the first hours of a disaster, thanks to their work of anticipation. Since the Haiti earthquake, many voices have called for new humanitarian governance. In Port-au-Prince, the Haitian President has called as well for the creation of Red Helmets at the UN. A few weeks later, he went with Nicole Guedj to meet Ban Ki-Moon, the UN Secretary General, to present this project. Ban Ki-Moon said he was keen to consider it. And the second is to use new technologies to support the humanitarian action: in order to back up the action of rescue teams, the Red Helmets Foundation designs logistical tools put at the disposal of NGOs and UN agencies. After the design of Emergesat, a humanitarian container of telecommunications, in partnership with the CNES and Thales Alenia Space, the Foundation involved itself in the creation of a global missing person search engine, MISSING.NET, new food rations, etc.

In order to reach all these aims, the Red Helmets Foundation is lobbying to persuade companies that their resources and capacities can be used by the humanitarian world. The Red Helmets Foundation wants to create partnerships between the public sector, the private one and non-profit organizations.

3/ United Nations Office for the Coordination of Humanitarian Affairs (OCHA)

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.

4/ Red Cross EU Office

The Red Cross/EU Office represents 26 Red Cross National Societies of the European Union Member States, the Norwegian Red Cross and the International Federation of Red Cross and Red Crescent Societies (IFRC). The Office coordinates relations and communications between its Members and the EU institutions.

The activities concentrate on Intra-community (inside the EU), International Development and International Humanitarian aid. The Red Cross/EU Office core mandate includes information capturing and sharing, advocacy and positioning, coordination and fund-raising.

The Red Cross/EU Office ensures a prompt exchange of information on the assessment of humanitarian disasters and possible responses from EU Red Cross National Societies and the IFRC. Also explores the possibilities for implementing DG ECHO's emergency funding decisions, and facilitates the presentation to DG ECHO of proposals from the EU Red Cross National

societies and the IFRC for actions in sectors where the Red Cross/Red Crescent implements an effective humanitarian response.

In emergency situations, the Red Cross/EU Office persuades EU institutions to act in the interest of vulnerable people and with full respect for the Fundamental Principles, seeks recognition from EU Institutions for National Societies' mandate and activities and promotes public understanding of the IFRC and National Societies' policies and activities in disaster management.

The RC/EU Office supports its members in seeking recognition for National Societies action in relation to disaster response activities, including civil protection by:

- Emphasising the importance of putting the humanitarian needs of individuals at the centre of planning and response.
- Improving communication, confidence, competence and capacity across National Red Cross Societies within the EU.
- Developing common messages and approaches.
- Focusing on building relationships with EU institutions through partnerships, joint initiatives and projects.
- Seeking to minimise the complexity and the dynamics for National Societies functioning within the EU.

5/ Monitoring and Information Centre (MIC)

Based at the European Commission in Brussels, the MIC is accessible 24/7 and can spring into action immediately when it receives a call for assistance. The MIC works in close cooperation with national crisis centres throughout the 32 countries participating in the Mechanism (EU 27, Croatia, the Republic of Macedonia, Iceland, Liechtenstein and Norway).

During emergencies the MIC plays three important roles:

- **Communications hub:** The MIC acts as a focal point for the exchange of requests and offers of assistance. This helps cut down on the participating states' administrative burden in liaising with the affected country. It provides a central platform for participating states to access and share information about the available resources and the assistance offered at any given point in time.
- **Information provision:** The MIC disseminates information on civil protection preparedness and response to participating states as well as a wider audience, both during emergencies and in 'calmer' periods. As part of this role, the MIC disseminates early warning alerts on natural disasters to both specialists and the general public and circulates the latest updates on ongoing emergencies and Mechanism interventions to its contact points.
- **Coordination:** The MIC facilitates the provision of European assistance through the Mechanism. This takes place at two levels: at headquarters level, by matching offers to needs, identifying gaps in assistance and searching for solutions, and facilitating the pooling of common resources where possible; and on the site of the disaster through the deployment of EU civil protection experts for assessment and coordination, when required.

6/ EU monitoring systems (ARGUS)

The European Commission decided to create a general European rapid alert system called ARGUS, with the capability to link all specialized systems for emergencies, and a central crisis centre (CCC) which would bring together all relevant Commission services during an emergency.

Although emergencies management is mainly the responsibility of the Member States, the European Commission has nevertheless a role to play when it is related to its domains of competences and can also offer its support to Member States.

ARGUS has been set up by a communication from the Commission with the aim to assure a coordinated and effective management of major multi-sectoral crisis that require a reaction at the European Community level. It is an internal network. Member States and external bodies are connected through sector-specific rapid alert systems.

More precisely, the system: Allows each Directorate General in the Commission to inform other Directorates General and services of a beginning or risk of multi-sectoral crisis via an alert exchange. Provides a coordination process that can be activated in case of crisis: the crisis coordination committee. Provides a common source of information that will be used by the Commission to communicate in an effective and coherent way with citizens.

Responsibility for handling and coordinating the response to the crisis including communication aspects should be taken by the relevant Directorate General, under the responsibility of the relevant Commissioner whose scope of activities usually includes this type of crisis because of its nature. The coordination with other directorate general is made via Argus network

7/ Euro-Atlantic Disaster Response Coordination Centre (EADRCC)

The Euro-Atlantic Disaster Response Coordination Centre (EADRCC) is a 24/7 focal point for coordinating disaster relief efforts among NATO member and partner countries.

The EADRCC's main function is to coordinate the response of NATO and partner countries to natural or man-made disasters within the Euro-Atlantic area. The Centre has guided consequence management efforts in emergencies like fighting floods, forest fires and dealing with the aftermath of earthquakes.

The Centre also functions as an information-sharing tool for NATO and partner countries on disaster assistance. It organises seminars to discuss lessons learned from NATO-coordinated disaster response operations and exercises. In addition, it holds an annual large-scale field exercise with a realistic scenario for effective interaction. Recent exercises have included scenarios such as a terrorist attack using chemical agents.

All these tasks are performed in close cooperation with the United Nations Office for the Coordination of Humanitarian Affairs (UN-OCHA), which retains the primary role in the coordination of international disaster relief operations. The EADRCC is designed as a regional coordination mechanism, supporting and complementing the United Nations in its efforts. Furthermore, the EADRCC's primary function is coordination rather than direction. In the case of a disaster requiring international assistance, it is up to individual NATO and partner nations to decide whether to provide assistance, based on information received from the EADRCC.

8/ European Community Humanitarian Office (ECHO)

The Commission's European Community Humanitarian Office (ECHO) was created in 1992 as an expression of the European solidarity with people in need all around the world.

In 2004 ECHO became the Directorate-General for Humanitarian Aid before integrating Civil Protection in 2010 for a better coordination and disaster response inside and outside Europe.

The EU Civil Protection Mechanism is made up of 32 states (27 EU Member States plus Croatia, Republic of Macedonia, Iceland, Liechtenstein and Norway) which co-operate in the field of civil protection to better protect people, their environment, property and cultural heritage in the event of major natural or man-made disasters occurring both inside and outside the EU. The assistance can take the form of in-kind assistance, equipment and teams, or involve sending experts to carry out assessments. It relies on government resources and, if assistance is required in third countries, usually works in parallel with or hands over to humanitarian aid.

Cooperation during disasters that overwhelm national capacities is a strong expression of European solidarity. There is clear added-value in working together, pooling resources and maximising the collective European effort on site.

The key instrument for European civil protection is the Civil Protection Mechanism (CPM) which was established in 2001. The operational heart of CPM is the European Commission's Monitoring and Information Centre (MIC) accessible 24 hours a day, seven days a week. It is currently being transformed into the European Emergency Response Centre (ERC). Any country inside or outside EU affected by a disaster and overwhelmed by its magnitude can make an appeal for assistance through the MIC/ERC.

Natural and man-made disasters know no borders. International co-operation in civil protection is on the increase as various countries and organizations come to each other's aid during an emergency. The European Civil Protection Mechanism has responded to many emergencies outside the EU. The European Union has a number of agreements with third countries, regional initiatives and international organizations to facilitate the provision of civil protection assistance and to undertake joint preparedness measures. The European civil protection covers three phases of the disaster management cycle: Prevention, Preparedness & Response.

9/ Médecins Sans Frontières (MSF)

Médecins Sans Frontières (MSF) is an international, independent, medical humanitarian organisation that delivers emergency aid to people affected by armed conflict, epidemics, natural disasters and exclusion from healthcare. MSF offers assistance to people based on need, irrespective of race, religion, gender or political affiliation.

MSF's actions are guided by medical ethics and the principles of neutrality and impartiality. MSF reserves the right to speak out to bring attention to neglected crises, to challenge inadequacies or abuse of the aid system, and to advocate for improved medical treatments and protocols.

MSF is neutral. The organisation does not take sides in armed conflicts, provides care on the basis of need, and pushes for independent access to victims of conflict as required under international humanitarian law.

10/ Protection Civile Sans frontières

Protection Civile Sans Frontières (PCSF) was established in 1997 aims to creating training programs, development assistance and relief and humanitarian support, expert post disaster, or at the request of national, international, public institutions, from Local Authorities, NGOs. To better meet the technical demands and changing the administrative status of an NGO, PCSF

develops an operational capacity to respond to specific requests to states, communities and local entities affected countries, whether in personnel, equipment, logistics and methodology of intervention.

Heavily involved alongside the local and national authorities, acting as field operator and service provider in the areas of activity:

- The expertise to support post-disaster humanitarian programs.
- The operational response, including the response to disasters and major natural hazards.
- The implementation of means for operational activities and programs with the logistics associated with it.
- Assistance or cooperation with other NGOs or organizations.
- Training of operational staff and policy makers in prevention and crisis management.
- Consultancy for assistance in the implementation of humanitarian programs.
- Response to tenders Community, seeking structural funds from donor organizations, national and international.

If the independent character of the Association PCSF is a fundamental value, the fact remains that the sense of commitment is consistent with the operational responsibilities and imposes thereby ethical obligations vis-à-vis States, Local Government and public funders, that are contributing to the activities of PCSF.

11/ Pompiers Sans Frontières

Pompiers Sans Frontières is a certified NGO French Civil Security, private, nonpartisan and nonprofit. It specializes in development aid. All its activities, whether specific or long term, aims to transfer expertise and community empowerment, institutional, civil society and actors of the Civil Protection.

Pompiers Sans Frontières France has 400 firefighters and volunteer actors of the partnership, over 6 antennas and 6 regional departmental offices in France, 1 branch in the Reunion Island, and 2 permanent delegations and 2 offices abroad. He has performed over 250 missions in 30 countries.

Pompiers sans frontières seeks to ensure that tomorrow's disaster no longer have the same impact on men and environment. It is for this reason Pompiers sans frontières is involved in the field of prevention and risk reduction.

12/ International Maritime Organization (IMO)

The International Maritime Organization is the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships.

IMO's main task has been to develop and maintain a comprehensive regulatory framework for shipping and its remit today includes safety, environmental concerns, legal matters, technical co-operation, maritime security and the efficiency of shipping.

13/ International Civil Defense Organization (ICDO)

The International Civil Defence Organisation (ICDO) is an intergovernmental organisation which objective is to contribute to the development by States of structures ensuring the protection and assistance of population and safeguarding property and the environment from natural or man-made disasters.

The ICDO takes an active part in the work of the UN System in the field of humanitarian action and prevention of, and preparedness for emergency situations. Thus the ICDO collaborates with:

- The United Nations Department of Humanitarian Affairs (OCHA),
- The Secretariat of the International Strategy for Disaster Reduction (ISDR) in whose favour in 1995 the ICDO Executive Council adopted a Resolution requesting that formal coordination of the fight against natural and other disasters be established;
- The World Health Organization, mainly its Emergency Assistance Operations and Humanitarian Action Division;
- The International Red Cross movement and in particular the International Committee of the Red Cross (ICRC) and the International Federation of Red cross and Red Crescent Societies (IFRC).

ICDO is committed to help its Member states to improve the capacity of national civil defence institutions. ICDO regularly calls on experienced expert for assessing risks, providing advices and assists Member States in the implementation of new policies.

14/ European Centre for Disease Prevention and Control (ECDC)

The European Centre for Disease Prevention and Control (ECDC) was established in 2005. It is an EU agency aimed at strengthening Europe's defenses against infectious diseases. It is seated in Stockholm, Sweden.

ECDC's mission is to identify, assess and communicate current and emerging threats to human health posed by infectious diseases. In order to achieve this mission, ECDC works in partnership with national health protection bodies across Europe to strengthen and develop continent-wide disease surveillance and early warning systems. By working with experts throughout Europe, ECDC pools Europe's health knowledge to develop authoritative scientific opinions about the risks posed by current and emerging infectious diseases.

Within the field of its mission, the Centre shall:

- Search for, collect, collate, evaluate and disseminate relevant scientific and technical data;
- Provide scientific opinions and scientific and technical assistance including training;
- Provide timely information to the Commission, the Member States, Community agencies and international organizations active within the field of public health;
- Coordinate the European networking of bodies operating in the fields within the Centres mission, including networks arising from public health activities supported by the Commission and operating the dedicated surveillance networks; and
- Exchange information, expertise and best practices, and facilitate the development and implementation of joint actions.

15/ Secretariat of the International Strategy for Disaster Reduction (ISDR)

UNISDR is the secretariat of the International Strategy for Disaster Reduction. It is the successor to the secretariat of the International Decade for Natural Disaster Reduction with the purpose of ensuring the implementation of the International Strategy for Disaster Reduction.

The mandate of UNISDR expanded in 2001 to serve as the focal point in the United Nations system for the coordination of disaster reduction and to ensure synergies among the disaster reduction activities of the United Nations system and regional organizations and activities in socio-economic and humanitarian fields (GA resolution 56/195). This was in response to a need for mainstreaming disaster risk reduction within the development and other areas of work of the UN.

Its core areas of work includes ensuring disaster risk reduction (DRR) is applied to climate change adaptation, increasing investments for DRR, building disaster-resilient cities, schools and hospitals, and strengthening the international system for DRR.

16/ Federal Office of Civil Protection and Disaster Assistance (BBK-Bundesamt für Bevölkerungsschutz und Katastrophenhilfe)

The Federal Office of Civil Protection and Disaster Assistance (BBK) was established on 1st May 2004 within the remit of the Federal Ministry of the Interior. Germany now has a central organisational element working to ensure the safety of the population, combining and providing all relevant tasks and information in a single place.

The work of the Office includes carrying out the tasks of the Federation with regard to civil protection (previously: "civil defence", in particular supplementary civil protection, health-protection measures, protection of cultural property, emergency drinking water supplies), planning and preparation of measures to provide emergency supplies and carry out emergency planning, planning and preparation of cooperation between the Federation and the Länder with regard to special hazards (coordination of crisis management), planning/conceptual prevention for the protection of critical infrastructures, basic and further training, and training in civil protection and disaster relief, disaster medicine, alerting and informing the population, expansion of research into civil protection, in particular research into NBC hazards, enhancing citizens' ability to help themselves, conceptual and planning tasks in the area of international cooperation with the participation of all national civil defence agencies.

17/ Federal Agency for Technical Relief (THW)

Every day, the Federal Agency for Technical Relief is active in Germany and across the world. Altogether, the voluntary experts commit more than one million hours per year to civil protection.

Across the world, the structure of THW is unique: As a Federal agency, THW belongs to the department of the Federal Ministry of the Interior. However, only one percent of the staff works full-time for the authority. 99 percent of the THW-members work on a voluntary basis for THW.

Nationwide more than 80,000 volunteers commit themselves during their leisure time in 668 local sections in order to provide professional help to people in distress.

THW flexibly adapts its structures to changing threat situations. Modern equipment and well-trained specialists are the basis of its high efficiency.

18/ German Committee for Disaster Reduction (DKKV)

DKKV is a national platform for disaster risk reduction in Germany. The interface to international organisations and initiatives dealing with disaster risk reduction. A center of competence for all matters in national and international disaster risk reduction.

DKKV supports:

- Interdisciplinary approaches in research of disaster risk reduction in other sectors as well as in politics and industry.
 - Dissemination of results in relation to disaster risk reduction on all levels of education
- DKKV demands:
- The implementation of the existing knowledge with respect to disaster risk reduction in politics, industry and administration.
 - The further development of a cross national and interdisciplinary cooperation in the operative disaster risk reduction.
 - The development of media related strategies for the advancing and strengthening precaution awareness in the society.

19/ Deutsche Gesellschaft für Technische Zusammenarbeit (GIZ)

GIZ offers customised solutions to complex challenges. They are an experienced service provider and assist the German Government in achieving its objectives in the field of international cooperation. They offer demand-driven, tailor-made and effective services for sustainable development.

GIZ operates in many fields: economic development and employment promotion; governance and democracy; security, reconstruction, peacebuilding and civil conflict transformation; food security, health and basic education; and environmental protection, resource conservation and climate change mitigation. They also support their partners with management and logistical services, and act as an intermediary, balancing diverse interests in sensitive contexts. In crises, they carry out refugee and emergency aid programmes. As part of their services, they also second development workers to partner countries.

20/ Emergency Military Unit (Unidad Militar de Emergencias - UME)

Emergency Military Unit (UME) is a joint force, organized on a permanent basis, which has the mission of intervention anywhere in Spain, to contribute to the safety and welfare of citizens, together with state institutions and government, in cases of serious risk, catastrophe, calamity or other public needs.

In addition, in November 2011, EMU passed the certification process of a team of urban search and rescue (USAR) to the UN international evaluators, which enables him to blend into the structure and rules of International Advisory Group Search and Rescue (INSARAG) and United Nations to act as quickly as possible wherever required.

21/ General Directorate for Civil Protection and Emergency (Dirección General de Protección Civil y Emergencias, DGPCE)

The objectives of the Civil Protection and Emergency are inform and prepare citizens through self-protection; constitute an organisation that brings together all public and private entities for rescuing people and property, in situations of disaster or catastrophe. And intervene effectively and in a coordinated manner in situations of serious risk, catastrophe or public disaster.

The basic functions of Civil Protection are the following:

- Precaution: Analyse situations of risk, their causes and effects, as well as areas that could be affected (Risk Inventory).
- Prevention: Adopt the measures necessary to prevent or reduce situations of danger with the means available.
- Planning: Devise emergency plans and lines of action for tackling situations of serious risk, catastrophe or public disaster.
- Intervention: Coordinate and direct the intervention of all the elements that make up civil protection, in order to protect and help people and their property.
- Rehabilitation: Assist the institutional bodies competent in the planning and implementing of measures for the restoration of essential public services and the socio-economic and environmental conditions required to bring normality back to the lives of those affected.

22/ The Civil Contingencies Secretariat (CCS)

The Civil Contingencies Secretariat (CCS) sits within the Cabinet Office at the heart of central government of UK. They work in partnership with government departments, the devolved administrations and key stakeholders to enhance the UK's ability to prepare for, respond to and recover from emergencies.

Their areas of work include: Emergency Preparedness, Response & Recovery; Risk ; Developing Capabilities; National Recovery Guidance; Exercises; Business Continuity; Infrastructure Resilience; Community Resilience; Resilient Communications; Communications.

To make sure that the Government can continue to function and deliver public services during a crisis. To work with departments and the wider Cabinet Office to make sure that plans and systems are in place and cover the full range of potential disruption. To lead the delivery of improved resilience across the government and the public sector. To support ministers in developing policy. To lead horizon-scanning activity to identify and assess potential and imminent disruptive challenges to the domestic UK. To build partnerships with other organizations and countries to develop and share best practice in horizon scanning and knowledge of the UK's critical networks and infrastructure. To improve the capability of all levels of government, the wider public sector and the private and voluntary sectors to prepare for, respond to, and manage potential challenges.

23/ The Disasters Emergency Committee (DEC)

The Disasters Emergency Committee unites the 14 leading UK aid agencies in their efforts to finance relief for people suffering major disasters in poorer countries.

They ensure donors' funds deliver effective and timely relief for people in need during emergencies around the world.

They also strive to improve standards in the delivery of humanitarian aid, the raising of funds via the public and the monitoring of their operations to ensure money is spent in an effective and fully accountable way.

24/ Office of Emergency Planning

This office was established within the Department of Defence of the Republic of Ireland to take a lead role in emergency planning to meet the new threat from international terrorism, including coordination of the responses of the various Departments and agencies. This Office is also exercising an oversight role in relation to peacetime planning, ensuring the best possible use of resources and compatibility between the plans involved. The OEP encompasses both civil and military staff.

It is responsible to the Minister for Defence for the co-ordination and oversight of emergency planning. Some key activities of the OEP are to refine and develop the arrangements that exist, to continuously improve them through review and revision and to generally provide the basis for an increased confidence in the emergency planning process.

25/ DZSU - National Protection and Rescue Directorate

The National Protection and Rescue Directorate is an independent, professional and administrative organisation of Croatia, tasked with preparing plans and managing operational forces as well as co-ordinating the activities of all participants in the protection and rescue system.

The basic tasks of the National Protection and Rescue Directorate are stipulated by the Law on protection and rescue. The most important tasks are risk and vulnerability assessment, drafting measures aimed at preventing crises and accidents, ensuring that these measures are implemented, and effective emergency management in case of major disasters.

The functionality of the Directorate is ensured through its territorial organization i.e. each County has a County Protection and Rescue Office consisting of Prevention, Planning and Supervision Department and the County 112 center. In County Offices of the four biggest cities Zagreb, Rijeka, Osijek and Split there are Protection and Rescue Departments, while in the County Offices on the coast (Zadar, Šibenik, Split and Dubrovnik) there are also State Intervention Units.

26/ The Danish Emergency Management Agency - DEMA

The Danish Emergency Management Agency is a Danish governmental agency under the Ministry of Defence with the principal task to manage the emergency response centres, to supervise the national and municipal rescue preparedness and to advise the authorities on matters of preparedness.

DEMA has directive responsibilities regarding fire prevention and the general development of emergency preparedness and response. Furthermore, DEMA is directly responsible for both chemical and nuclear preparedness and response.

DEMA's mission is to cushion the effects of accidents and disasters on society and to prevent harm to people, property and the environment.

27/ Estonian Rescue Board

The Estonian Rescue Board is a government institution under the jurisdiction of the Ministry of the Interior, which has the leading role in planning preparedness for emergencies and the operational management of Regional Rescue Centres. It is also responsible for the development and implementation of national rescue policies. The Rescue Board represents Estonia in bilateral and multilateral relations related to civil protection and cooperates with the emergency management and civil protection bodies of UN, EU, NATO, and other relevant organisations.

28/ National Directorate General for Disaster Management (NDGDM)

The central body for disaster management in Hungary is the National Directorate General for Disaster Management (NDGDM) operating under the control of the Ministry of the Interior.

Its main activities are updating the current civil protection duty system, monitoring a public alarm system for industrial plants; use education to build a culture of safety and resilience, to manage information for a better public awareness and strengthening the effectiveness of international urban search and rescue assistance.

The Directorate General determines the professional requirements of prevention, rescue and disaster management, directs and supervises the work of the subordinated organs, participates in the prevention and management of the expected consequences of nuclear accidents, natural or industrial disasters, as well as in the organization of protection and planning at national level.

29/ The Luxembourg Rescue Services Agency (Administration des services de secours - ASS)

The Luxembourg Rescue Services Agency is subordinate to the Minister of Home Affairs and the Greater Region which assures the political and administrative authority of the ASS.

In the event of a catastrophe or disaster, the ASS leads rescue operations and reports to the Minister of Home Affairs and the Greater Region. The ASS is responsible for implementing all the necessary measures and means, which must be taken in order to protect and supply aid to the population and to safeguard the national inheritance and other assets. The ASS is responsible for the organisation of the first aid, rescue and transport of victims needing medical care. It also sets up or contributes to general and individual intervention plans and organises public training in first aid. The ASS is qualified to recruit and train the instructors (volunteers) of the assistance units and to supervise the volunteers' instructions in the various fields of protection.

2.3.3 Analysis of Emergency Logistics European stakeholders

This section analyses the current situation of the overall functioning of the selected Emergency Logistics European stakeholders that is identifying the key elements managed by the different stakeholders to successfully fight against a crisis.

The following issues will be analyzed for each stakeholder:

- Types of crises addressed by the stakeholder.

- Emergency response concept: operational concept / modus operandi, etc.
- Role and functions of the stakeholder during the emergency phases.
- Resources: actors with roles and responsibilities.
- Flows of information: monitoring flow, command and control flow and the decision making flow (coordinating principles).
- Infrastructure available.

This analysis will be performed as a detailed mapping (matrix) of the stakeholders versus the key issues relevant to Emergency Logistics.

The following Table shows the stakeholders identified, the different types of crises in which these stakeholders and the DiCoMa system could participate and finally, if the stakeholders have some available infrastructure to fight against crisis.

Stakeholder	Types of crises addressed	Operational concept	Available infrastructure
Fire Department	All types of crises and disasters, such as large fires, traffic incidents, collapsed buildings, forest fires.	First responder: to rescue lives and work on fire extinguishing. Fire Department can work in 1st and 2nd level to combat incident as members to advised on actions that need to be taken and propose on decisions.	Equipment for first responders, vehicles, etc.
Medical services	All types of crises and disasters, such as large fires, traffic incidents, collapsed buildings, forest fires.	First responder: to attend injured. Medical Services can work in 1st and 2nd level to combat incident as members to advise on actions that need to be taken and propose on decisions.	Equipment for first responders like medical kit, and tent hospitals. Also vehicles like ambulances and helicopters.
Police	All types of crises and disasters, such as large fires, traffic incidents, collapsed buildings, forest fires.	First responder: to rescue lives, work on traffic order. Police can work in 1st and 2nd level to combat incident as members to advise on actions that need to be taken and propose on	Equipment for first responder, vehicles, helicopters, motorcycles, etc.

		decisions.	
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Table 2: Analysis of stakeholders involved in crisis management

	Stakeholder	Types of crises addressed	Operational concept	Available infrastructure
1	European Union Satellite Centre (EUSC)	Disasters like large fires, traffic incidents, or forest fires.	EUSC can work as 1 st level to management the incident: it receives requests from its users to gather all types of thematic information available about a given area of interest in the world.	Satellites network (spatial and geospatial satellites)
2	Casques Rouges	All types of crises and disasters, such as large fires, traffic incidents, collapsed buildings, forest fires.	Casques Rouges can work in 1 st and 2 nd level to combat incident as members to advise on actions that need to be taken and propose on decisions.	EMERGESAT enables communication via satellite links for exchanging data with command posts and remote services. EMERGESAT provides a local communication and data exchange network for different intervention teams using GSM, VHF and Wifi technologies.
3	United Nations Office for the Coordination of Humanitarian Affairs (OCHA)	All types of crises and disasters, such as floods, earthquakes, or humanitarian crisis	OCHA can work as 1 st level. OCHA can mobilize and coordinate effective and principled humanitarian action in partnership with national and international actors.	
4	IFRC's (International Federation of Red	Crisis and disasters, such as floods,	First responder: to attend injured.	Equipment for first responders like medical kit, and tent

	Stakeholder	Types of crises addressed	Operational concept	Available infrastructure
	Cross Red Crescent Societies)	earthquakes, collapsed buildings, forest fires or traffic incidents	Red Cross can work in 1 st and 2 nd level to combat incident as members to advise on actions that need to be taken and propose on decisions.	hospitals. Also vehicles like ambulances and helicopters.
5	Monitoring and Information Centre - MIC	All types of crises and disasters, such as floods, earthquakes, or humanitarian crisis	MIC can works in 1 st level of management. MIC plays three important roles: Communications hub, information provision and coordination	ARGUS: a general European rapid alert system. Tool of the European Commission with the capability to link all specialized systems for emergencies, and a central crisis centre (CCC) which would bring together all relevant Commission services during an emergency.
6	EU monitoring systems (ARGUS)	All types of crises and disasters, such as floods, earthquakes, or humanitarian crisis	ARGUS is used like a management unit at 1 st level	
7	Euro-Atlantic Disaster Response Coordination Centre (EADRCC)	All types of crises and disasters, such as floods, forest fires, earthquakes, humanitarian crisis, or snow storms	EADRCC can be an 1 st and 2 nd level to combat incident unit, because the EADRCC's primary function is coordination.	
8	European Community Humanitarian Office (ECHO)	Major natural or manmade disasters occurring both inside and outside the EU	ECHO can work at 1 st level as members to advise on actions that need to be taken and propose on decisions.	The assistance can take the form of in- kind assistance, equipment and teams, or involve sending experts to carry out assessments

	Stakeholder	Types of crises addressed	Operational concept	Available infrastructure
9	Medecins Sans frontieres	Humanitarian crisis and all kind of major natural disaster	They can be first responder to attend injured. And also they can work in 1 st and 2 nd level to combat incident as members to advise on actions that need to be taken and propose on decisions.	Equipment for first responders like medical kit, and tent hospitals. Also vehicles like ambulances.
10	Protection Sans Frontières	All types of crises and disasters, such as floods, earthquakes, collapsed buildings, forest fires.	First responder: to rescue lives They can work in 1 st and 2 nd level to combat incident as members to advise on actions that need to be taken and propose on decisions.	Equipment for first responders, vehicles, etc.
11	Pompiers Sans frontières	All types of crises and disasters, such as floods, earthquakes, collapsed buildings, forest fires.	First responder: to rescue lives and work on fire extinguishing. They can work in 1 st and 2 nd level to combat incident as members to advise on actions that need to be taken and propose on decisions.	Equipment for first responders, vehicles, etc.
12	International Maritime Organization	Marine disaster	IMO can work at 1 st level to advise on actions that need to be taken and propose on decisions.	
13	International Civil Defense Organization	Major natural or manmade disasters	ICDO can work at 1 st level to advise on actions that need to be taken and propose on	

	Stakeholder	Types of crises addressed	Operational concept	Available infrastructure
			decisions.	
14	European Centre for Disease Prevention and Control (ECDC)	ECDC's mission is to identify, assess and communicate current and emerging threats to human health posed by infectious diseases.	They can work in 1 st and 2 nd level to combat incident as members to advise on actions that need to be taken and propose on decisions.	Equipment for identify or work with infectious diseases
15	Secretariat of the International Strategy for Disaster Reduction (ISDR)	ISDR aims to reduce the damage caused by natural hazards like earthquakes, floods, droughts and cyclones, through an ethic of prevention.	They can work at 1 st level as members to advise on actions that need to be taken and propose on decisions.	
16	Federal Office of Civil Protection and Disaster Assistance (BBK-Bundesamt für Bevölkerungsschutz und Katastrophenhilfe) (Germany)	All types of crises and disasters, such as floods, earthquakes, collapsed buildings, forest fires into Germany	First responder to rescue lives and work on fire extinguishing. They can work in 1 st and 2 nd level to combat incident as members to advise on actions that need to be taken and propose on decisions.	Equipment for first responders, vehicles, etc.
17	Technisches Hilfswerk (Federal Agency for Technical Relief, THW)	THW assists people after catastrophes and accidents, in German and around the world	First responder to rescue lives and work on floods.	Equipment for first responders, vehicles, etc.
18	Deutsche Gesellschaft für Technische Zusammenarbeit	GIZ support the German Government in achieving its objectives in the	They can work in 1 st level as members to advise on actions that need to be taken and	

	Stakeholder	Types of crises addressed	Operational concept	Available infrastructure
	(GIZ)	field of international cooperation for sustainable development.	propose on decisions	
19	Unidad Militar de Emergencia (UME)	All types of crises and disasters, such as floods, earthquakes, collapsed buildings, forest fires.	First responder: to rescue lives and work on fire extinguishing. UME can work in 1 st and 2 nd level to combat incident as members to advise on actions that need to be taken and propose on decisions.	Equipment for first responders like medical kit, tent hospitals, vehicles like trucks, ambulances and helicopters
20	General Directorate for Civil Protection and Emergency (Dirección General de Protección Civil y Emergencias, DGPCE)	All types of crises and disasters, such as floods, earthquakes, collapsed buildings, forest fires into Spain	First responder to rescue lives and work on fire extinguishing. They can work in 1 st and 2 nd level to combat incident as members to advise on actions that need to be taken and propose on decisions.	Equipment for first responders, vehicles, etc.
21	The Civil Contingencies Secretariat (CCS) UK	All types of crises and disasters, such as floods, earthquakes, collapsed buildings, forest fires into United Kingdom	First responder to rescue lives and work on fire extinguishing. They can work in 1 st and 2 nd level to combat incident as members to advice on actions that need to be taken and propose on decisions.	Equipment for first responders, vehicles, etc.
22	The Disasters Emergency Committee (DEC) UK	All types of crises and disasters, such as floods, earthquakes, collapsed buildings, forest fires in	First responder to rescue lives or to help people. They can work in 1 st and 2 nd level to combat incident as	Equipment for first responders, vehicles, etc.

	Stakeholder	Types of crises addressed	Operational concept	Available infrastructure
		poorer countries	members to advice on actions that need to be taken and propose on decisions.	
23	Office of Emergency Planning Ireland	All types of crises and disasters, such as floods, earthquakes, collapsed buildings, forest fires into the Republic of Ireland	First responder to rescue lives and work on fire extinguishing. They can work in 1 st and 2 nd level to combat incident as members to advice on actions that need to be taken and propose on decisions.	Equipment for first responders, vehicles, etc.
24	DZSU National Protection and Rescue Directorate Croatia	All types of crises and disasters, such as floods, earthquakes, collapsed buildings, forest fires into Croatia	First responder to rescue lives and work on fire extinguishing. They can work in 1 st and 2 nd level to combat incident as members to advice on actions that need to be taken and propose on decisions.	Equipment for first responders, vehicles, etc.
25	The Danish Emergency Management Agency (DEMA)	All types of crises and disasters, such as floods, earthquakes, collapsed buildings, forest fires into Denmark	First responder to rescue lives and work on fire extinguishing. They can work in 1 st and 2 nd level to combat incident as members to advice on actions that need to be taken and propose on decisions.	Equipment for first responders, vehicles, etc.
26	Estonian Rescue Board	All types of crises and disasters, such as floods, earthquakes, collapsed buildings, forest fires into	First responder to rescue lives and work on fire extinguishing. They can work in 1 st and 2 nd level to combat incident as	Equipment for first responders, vehicles, etc.

	Stakeholder	Types of crises addressed	Operational concept	Available infrastructure
		Estonia	members to advice on actions that need to be taken and propose on decisions..	
27	National Directorate General for Disaster Management (NDGDM) Hungary	All types of crises and disasters, such as floods, earthquakes, collapsed buildings, forest fires into Hungary	First responder to rescue lives and work on fire extinguishing. They can work in 1 st and 2 nd level to combat incident as members to advice on actions that need to be taken and propose on decisions..	Equipment for first responders, vehicles, etc.
28	The Luxembourg Rescue Services Agency (Administration des services de secours - ASS)	All types of crises and disasters, such as floods, earthquakes, collapsed buildings, forest fires into Luxembourg	First responder to rescue lives and work on fire extinguishing. They can work in 1 st and 2 nd level to combat incident as members to advice on actions that need to be taken and propose on decisions.	Equipment for first responders, vehicles, etc.

Table 3: Analysis of stakeholders identified in Europe

2.3.4 Integration of European Emergency Logistics Stakeholders into a Pan-European space for DiCoMa

This section assesses the potential of the stakeholders for their integration into a Pan-European space for DiCoMa units. According with the stakeholders identified in previous sections, this section assesses how these stakeholders can be integrated into a Pan-European space. For doing this we evaluate each stakeholder and we decide if each one can be included into DiCoMa units to create a Pan-European space which can act in a coordinated manner for fighting against any risk or emergency.

It is very important to have a Pan-European space to fight against any risk or disaster because this allows every European country to be ready for whatever kind of disaster thanks to the proven experience of each country in different types of crises. For example, UK and Spain are ready for

terrorist attacks because terrorist have attacked these countries, and Germany is ready for the flood cases and became more prepared to the future flood cases after the Elbe 2002 incident .

In the following a division of stakeholders depending on their nature, namely NGOs, national and international organizations, is attempted. In subsection 3.4.1 it shows the NGO's that could be integrated into a Pan-European space; in subsection 3.4.2 it shows the national agencies that could be integrated and, finally, in subsection 3.4.3 it shows the international candidates to integrate this Pan-European space.

2.3.4.1 NGO's stakeholders

In this subsection a study about what NGO's related to risk and emergency events could be integrated into a Pan-European space for DICOMA units is shown. The DiCoMa units are First Responder, 1st level of operation and management and 2nd level of operation and management, so the NGO's should be integrated into these units.

2/ Red Helmets Foundation

This is a new NGO that does not have the significant international presence. Currently, they are trying to create a special division of Red Helmets within UN. So, the Red Helmets Foundation is still an embryonic institution but with a lot of potential of activities. Also, we have to remember that this institution has an important technological tool, called Emergesat. It is a humanitarian container of telecommunications, in partnership with important technological companies.

9/ Médecins Sans Frontières (MSF)

As mentioned in the previous section, Médecins Sans Frontières (MSF) is an international, independent, medical humanitarian organisation that delivers emergency aid to people affected by armed conflict, epidemics, natural disasters and exclusion from healthcare. This is one of the most important NGO's in the world. So it is very important to link this entity to the Pan-European space for DICOMA units. This can integrate all the DiCoMa's units. MSF works as first responders as soon as they arrive to the crisis location. Also they can work as members to advise on actions that need to be taken and propose on decisions.

10/ Protection Civile Sans Frontières

Protection Civile Sans Frontières (PCSF) was established in 1997 and aims to make training programs focused on development assistance and relief and humanitarian support, expert post disaster, as part of the activities of PCSF, or upon request from national, international, public institutions, Local Authorities and NGOs.

PCSF develops an operational capacity to respond to specific requests from Countries, communities and local entities affected countries, whether in personnel, equipment, logistics and methodology of intervention.

11/ Pompiers Sans Frontières

This Pompiers Sans Frontières NGO does a great job in several actions around the world. .

Pompiers Sans Frontières is conducting Emergency, Rehabilitation and Development missions emphasizing sustainable development, which benefits all of the population. Since 1991, Pompiers Sans Frontières has acquired a working knowledge of local systems for Security and Civil Defence both public and private. This experience now enables to optimize its cooperation and assistance throughout the world.

Also, they have experience in other emergencies events, because they have performed over 250 missions in 30 countries.

With these data we think that they should be part of Pan-European space for DiCoMa. For this, they have 400 firefighters and volunteer actors of the partnership, which could be First Responder units. Also they can work providing expertise both nationally and internationally on different continents to Europe.

2.3.4.2 National stakeholders

In general, all the national stakeholders should be integrated into the Pan-European space for DICOMA. Some of these stakeholders have more experience in risk and emergencies than other. And it is common that they have experience in different disasters. Countries like Spain or United Kingdom have more experiences on terrorist attacks that other countries like the Netherlands or Germany, that they have more experience in flood emergencies.

16/ Federal Office of Civil Protection and Disaster Assistance (BBK-Bundesamt für Bevölkerungsschutz und Katastrophenhilfe)

This is the equivalent organization to Civil Protection in Germany. They have a lot of experience in floods disaster, so they can advise on actions that need to be taken and propose on decisions. Also they have experience in conceptual and planning tasks in the area of international cooperation with the participation of all national civil defence agencies.

So, we think that this Federal Office could integrate a multidisciplinary team of DiCoMa system.

17/ Federal Agency for Technical Relief (THW)

THW is a Federal Agency belongs to the Germany's Federal Ministry of the Interior. And they activity is doing in Germany and also across the world. THW flexibly adapts its structures to changing threat situations. Modern equipment and well-trained specialists are the basis of its high efficiency.

Due to the many volunteers they have (it is a federal agency of Germany), we consider that THW would be a good candidate to be integrated in the Pan-European space for DiCoMa. The volunteers could be either First Responder teams of they could even be integrated in all levels of DiCoMa platform.

18/ German Committee for Disaster Reduction (DKKV)

DKKV connects policy makers, industry and administration to translate findings of disaster research into practical measures. The organization aims to utilize the benefits of integrated risk management by reducing the boundaries between countries and research disciplines. DKKV could be beneficial to disseminate project results and connect with other relevant organizations.

19/ Deutsche Gesellschaft für Technische Zusammenarbeit (GIZ)

GIZ are an experienced service provider and assist the German Government in achieving its objectives in the field of international cooperation. Maybe this agency could work in the Pan-European space through the German Government (the BBK agency).

20/ Emergency Military Unit (Unidad Militar de Emergencias - UME) (Spain)

Emergency Military Unit (UME) is a military unit and they have a lot of experiences in disasters like earthquakes and forest fires. Also, they participated in international disasters like the Haiti's earthquake. For all their experience, they could be a First Responder team and a 2nd level unit into the Pan-European space.

21/ General Directorate for Civil Protection and Emergency (Dirección General de Protección Civil y Emergencias, DGPCE)

As mentioned in this chapter for the CSS of UK and the BBK of Germany, this agency is the responsible of Civil Protection in Spain. They have experience in terrorism attack, floods, earthquakes and maritime disasters, so they can advise on actions that need to be taken and propose on decisions. Also, they have a lot of experience in mobilize first responder teams and to coordinate and direct the intervention of all the elements that make up civil protection, in order to protect and help people and their property.

22/ The Civil Contingencies Secretariat (CCS) - UK

The Civil Contingencies Secretariat (CCS) is the equivalent organization to Civil Protection in the United Kingdom. They have experience in terrorism attack, so they can advise on actions that need to be taken and propose on decisions. Also, they have a lot of experience in advice to Government on actions that need to be taken and propose on decisions.

23/ The Disasters Emergency Committee (DEC) - UK

The DEC is an agency to finance relief for people suffering major disasters in poorer countries. So, they are an agency of humanitarian aid. For this, we think that this agency should not be included within a Pan-European space for DiCoMa.

24/ Office of Emergency Planning (OEP) - Ireland

Like the UK agency, the Office of Emergency Planning has experience in terrorism attacks and in coordination of different organisms.

25/ DZSU - National Protection and Rescue Directorate - Croatia

The National Protection and Rescue Directorate could bring their experience in fighting fires and in organization task to the Pan-European space.

26/ The Danish Emergency Management Agency - DEMA - Denmark

DEMA has directive responsibilities regarding fire prevention and the general development of emergency preparedness and response. Furthermore, DEMA is directly responsible for both chemical and nuclear preparedness and response. So, they could bring their experience in these fields as part of DiCoMa teams.

27/ Estonian Rescue Board

This institution should be part of the Pan-European space since they represents Estonia in bilateral and multilateral relations related to civil protection and cooperates with the emergency management and civil protection. They could bring is experience in the coordination of different teams.

28/ National Directorate General for Disaster Management (NDGDM) - Hungary

NDGDM is the central body for disaster management in Hungary so they could be a 1st level unit of DiCoMa to bring its experience into the common space.

29/ The Luxembourg Rescue Services Agency (Administration des services de secours - ASS)

The ASS has experience to recruit and train the instructors (volunteers) of the assistance units and to supervise the volunteers' instructions in the various fields of protection. Also, they have experience to lead rescue operations.

2.3.4.3 International stakeholders

This section shows the most important European stakeholders related to risk, emergency and disaster management which work both, in Europe and the rest of the world. In general, these stakeholders have a world-wide scope and they have a lot of experience at operational level (i.e. First Responder units) or in providing information and help/services to other entities.

1/ European Union Satellite Centre (EUSC)

The EUSC is an Agency dedicated to the exploitation and production of information derived primarily from the analysis of earth observation space imagery in support of Union decision-making in the field the Common Foreign and Security Policy (CFSP). In a disaster management it is important to know all the information related to the location of the incident, so this Agency has a

lot of importance in this area. In this way, the EUSC could have an important role as a part of a 1st level unit.

3/ United Nations Office for the Coordination of Humanitarian Affairs (OCHA)

OCHA is the part of the United Nations Secretariat responsible for bringing together humanitarian actors to ensure a coherent response to emergencies. It retains the primary role in the coordination of international disaster relief operations. OCHA also ensures there is a framework within which each actor can contribute to the overall response effort.

In this way, OCHA is one of the most important international stakeholders and they should be part of the Pan-European space for DiCoMa. They could be part of 1st level units and as members to advice on actions that need to be taken and propose on decisions.

4/ Red Cross EU Office

The Red Cross/EU Office represents 26 Red Cross National Societies of the European Union Member States, the Norwegian Red Cross and the International Federation of Red Cross and Red Crescent Societies (IFRC). The Office coordinates relations and communications between its Members and the EU institutions.

Due to the long experience of this international organization in all kinds of disasters and armed conflict, they should be part of all the units of DiCoMa.

5/ Monitoring and Information Centre (MIC)

As mentioned in the previous section, the MIC works in close cooperation with national crisis centres throughout the EU 27, Croatia, the Republic of Macedonia, Iceland, Liechtenstein and Norway.

Having into account the experience of the MIC in communication, information provision and coordination of disaster and emergencies, they have an important role into a 1st level unit of the Pan-European space for DiCoMa.

6/ EU monitoring systems (ARGUS)

The Commission decided to create a general European rapid alert system called ARGUS, with the capability to link all specialized systems for emergencies, and a central crisis centre (CCC) which would bring together all relevant Commission services during an emergency (terrorist attacks, tsunami, etc). Although emergencies management is mainly the responsibility of the Member States, the European Commission has nevertheless a role to play when it is related to its domains of competences and can also offer its support to Member States.

ARGUS has been set up by a communication from the Commission in December 2005 with the aim to assure a coordinated and effective management of major multi-sectoral crisis that require a reaction at the European Community level. It is an internal network. Member States and external bodies are connected through sector-specific rapid alert systems.

7/ Euro-Atlantic Disaster Response Coordination Centre (EADRCC)

Like the last Agency, the EADRCC works with the NATO member. Also, they have experience in scenarios such as a terrorist attack using chemical agents.

So, this is an important organization that could be part of a DiCoMa unit in the Euro-Atlantic area.

8/ European Community Humanitarian Office (ECHO)

The ECHO co-operate in the field of civil protection to better protect people, their environment, property and cultural heritage in the event of major natural or man-made disasters occurring both inside and outside the EU.

As it comments in the previous section, the assistance of ECHO can take the form of in-kind assistance, equipment and teams, or involve sending experts to carry out assessments. So, they could be part of a 1st or 2nd level units. Maybe they could be part of the first responder teams.

12/ International Maritime Organization (IMO)

Maybe the IMO agency could be useful as 1st level unit for its experience in the safety and security of shipping. They have experience also in the area of the prevention of marine pollution by ships, so they could be useful in marine disasters.

13/ International Civil Defense Organization (ICDO)

This agency collaborates with a lot of international organization like OCHA, ISDR, the World Health Organization or the ICRC. The role of this agency on the stage is to help its Member states to improve the capacity of national civil defense institutions.

In this way, ICDO could be part of a 1st level unit, although they don't provide real work to disaster management, i.e., its work could be done by other more specialized national and international agencies. This is because they don't work in situ and also they work more the area of the prevention.

14/ European Centre for Disease Prevention and Control (ECDC)

The ECDC is an EU agency aimed at strengthening Europe's defenses against infectious diseases. When a disaster brings a biohazard, it is necessary to have experts to help in this situation. Also, ECDC works in partnership with national health protection bodies across Europe.

15/ Secretariat of the International Strategy for Disaster Reduction (ISDR)

Like the ICDO agency, UNISDR works focuses on disaster prevention. In this way, they could be part of a 1st level unit, although the prevention area is not an important part of DiCoMa, more focuses in the reaction over a disaster or emergency.

2.4 Interoperability in Emergency Response

While this is a useful definition for infrastructures such as computers and telecommunications, it falls short in dealing with the human and organizational factors during a crisis response. Crisis response encompasses technical, organizational, and cultural interoperability. Crises are unpredictable and endanger large segments of a population, often requiring focused or tailored responses. This creates the need for flexibility, preparedness, and adequately trained personnel capable of dealing with all-hazards events. Training should develop responders capable of rapidly assessing threats and acting accordingly, using ethical measures for mitigation, containment, and recovery.

Interoperability involves commonality of processes and technology, facilitating interactions between responders, stakeholders, and volunteers. Coordination through interoperability is necessary for efficient and timely crisis response. So far, developing the necessary process and infrastructure for crisis response has proven to be difficult.

The shared understanding across the many different first responder and emergency communities is more than a common language and information sharing protocols.

Integration will continue to be restrained across disciplines and regions as long as crisis responders are not privy to information pertaining to the total response capacity and situational awareness. This includes knowledge of transportation, patient care, medical supplies, and manpower assets that each provider may have at its disposal. Integration will remain elusive until active steps are taken to achieve transparent communication and information sharing between concerned participants. Integrated responses require collaboration between police, fire, emergency medical services, military responders, and public healthcare providers at all organizational levels. First responders from various agencies and jurisdictions must be able to reinforce each other to meet the challenges presented by different crises.

One of the greatest difficulties facing the crisis management community arises from the vertical and horizontal fragmentation in today's governing organizations. Fragmentation fosters roadblocks to crisis planning and response. Horizontal fragmentation can be overcome through the development of interpersonal relationships between actors in the first responder community. The challenges presented by vertical fragmentation, however, require more formal solutions that address the organizational and cultural issues presented by different agencies. The response most likely to be successful is one that can utilize both an informal and formal approach.

Another significant obstacle to interoperability is the reliance on government funding programs. Many funding programs are competitive and make it difficult to develop the relationships essential for interoperability.

This adversarial culture is in direct contrast to collaboration and cooperation culture. The complexity of these obstacles brings to focus conflict between integrated contingency planning and the non-uniform realities of public, private, and government organizations.

Political maneuvering, poorly defined command systems, and uncertainty about which roles and responsibilities are held by which organizations are also barriers to crisis response. They put emphasis on the need for a clear command structure, noting that ambiguity could cause significant disorder in a crisis, hindering effective response.

Training the first responder community effectively presents numerous difficulties. The great diversity across disciplines is one of the major causes of these difficulties. Impediments that arise

from training individuals in highly specialized fields with differing levels of education and at times contradictory cultural ethics are formidable.

Along with the need to train first responders there is also the need to train the emergency management professionals from support organizations in fields such as finance and administration. All parties involved in a crisis must not only be trained to a high level of proficiency in their given field, but must also possess awareness of the other responders. Training should encompass all aspects of crisis planning, response, recovery, and mitigation.

Another benefit of training is increased awareness of the special needs of vulnerable populations. Examples are rehabilitation clinics and retirement facilities. The service providers to vulnerable populations will be better able to provide continued healthcare if they are aware of the timetable of response and just what external assistance can be expected.

By uniting all communities, there is a greater opportunity for mutual benefits to be derived. Interdisciplinary training may also assist healthcare providers in non-crisis situations such as immunizations, where responders can act as reserve healthcare providers in limited capacity. Also, through type-specific interdisciplinary training, such as violent situations, we can provide responders with the cross-agency awareness that has been identified as essential to effective crisis response.

Finally, it must be recognized that not every type of crisis can be anticipated. However, responders can be made ready to address these through effective training. The key to successful crisis management and response is the creation of cross-discipline and interagency integrated response. Responsible organizations at the federal and state levels should provide resources and opportunities and promulgate policies to ensure interoperability training and teamwork in disaster response.

Interoperability on various levels is a prerequisite for effective collaboration and communication. The interoperability levels discussed here establish multiple perspectives for a comprehensive understanding of what issues may enable or hinder interoperability in the context of emergency response.

2.4.1 Interoperability Framework

An interoperability framework consists of a set of rules and agreements describing how organizations should best interact with each other. It also provides policies and guidelines for how standards should be selected and used.

According to its scope and applicability, the interoperability framework must be adapted to a specific situation; in this case, public safety constitutes the context at hand. A comprehensive interoperability framework gives an indication of the direction in which interoperability and corresponding standards might develop in the near future.

To achieve interoperability among diverse public safety agencies, there must be consensus on the objectives of interoperability, discussed and agreed upon by the larger public safety community. Generally, such objectives address agility, availability, cost effectiveness, extensibility, flexibility, maintenance, multiple use, openness, performance, scalability, and security. These objectives are often stated in the form of guidelines and principles to determine what should (and should not) be achieved with interoperability; they provide guidelines for decision making in implementations, and serve as compliance checks for post-implementation

purposes. Binding objectives that are in accordance with statutory and architectural provisions support the coordinated development of distributed, interoperable solutions.

2.4.2 Interoperability Levels

Stated objectives and guidelines alone are hardly enough to address the complex challenges that interoperability presents. A conceptual framework is needed to investigate different facets of this challenge that are not only technical and semantic, but organizational, legal and political as well. To establish interoperability, it considers the following five facets as levels that must be addressed:

Political Context

Collaboration and cooperation across boundaries require political support. On a political level, in order for collaboration to work, the vision and goals of the involved actors must be aligned. Consequently, sufficient priority and resources must be available on an ongoing and timely basis to address the political context.

Legal Interoperability

Legality is a precondition for collaboration across jurisdictional and organizational units. An alignment of diverse legislation may be required. Interoperability can be affected in numerous ways, such as differences in administrative law, intellectual property rights, privacy and data protection, public administration transparency or the re-use of public sector information. Exchanged data need to be in accordance with the law of its place of origin. Furthermore, data originated in another jurisdiction must be mutually recognized.

Organizational Interoperability

To achieve collaboration on an organizational level, interoperability must address the integration of business processes and the exchange of information across organizational boundaries. This includes a broad set of elements of interaction, particularly business processes management and the design of interfaces that enable seamless interaction among different organizational units.

Semantic Interoperability

On the semantic level, cooperating organizational units have to process information from their partners in a meaningful way. This requires agreement on the meaning and format of the exchanged information (e.g., agreement on data structure, data elements, and protocols). Thus, sector-specific, semantic standards play an important role

Technical Interoperability

On the technical level, interoperability covers technical aspects of interconnecting systems and services to include interfaces, interconnection services, data integration, middleware, and security services.

From an analytical point of view, these five levels offer helpful insights as to "where" and "what" interoperability issues may arise as well as "which" actor may respond to them (e.g., a legally non-compliant transaction on the organizational level that needs to be addressed by a legislative function). Establishing open, non-proprietary protocols for emergency response communication and information systems would allow systems to evolve more readily and incorporate more intelligent and robust capabilities that would make them more effective.

The interoperability framework addresses information security implicitly, as part of the technical, organizational, and legal level. An information broker may handle a variety of sensitive information that needs to be protected accordingly; thus, information security should be an explicit issue in this context.

Finally, governance is an issue that addresses all levels of interoperability. Governance is concerned with maintaining and improving the maturity level of interoperability. As such, governance assures that interoperability is preserved when standards are further developed. As outlined in the brief literature review above, the organizational and semantic levels constitute a primary challenge, and the following subsections focus on these issues.

2.4.2.1 Organizational Level

Regarding organizational interoperability, organizations involved in disaster prevention and response are only gradually beginning to work together more closely. There are organizational and technical barriers that inhibit closer cooperation. Interoperability in organizational terms means closely aligned processes and activities for operation and communication. For over half a century, the functional organization has been criticized for rigidity and inflexibility.

For more than 20 years now, computer-supported cooperative work (CSCW) has been available to overcome functional barriers. Since information and communication technology (ICT) was designed to bypass functionally organized information and communication channels, the need for organizational redesign ensued. As business processes are becoming increasingly complex and heterogeneous, organizations are undergoing a shift from functionally organized bureaucracies to networked teams across processes.

In contrast to traditional definitions of the business process as a set or collection of activities we define the business process as "a collection of interconnected events which are purposively conceived, planned, designed, implemented, executed and controlled", where events are defined as "a significant change in state". Organizing around events thus builds flexibility into organizational processes. In changing environments, it becomes less important to follow a fixed set of predefined activities correctly than to respond to changes in a timely and appropriate fashion.

Strategic Direction

The first step towards organizational interoperability is the strategic intent to cooperate more closely with other organizations involved in disaster prevention and response. This strategic intent must be addressed in the political context and the legal level of the interoperability framework. A strategy requires a vision and a willingness to act. The definition of a strategy means that the development of an organization is not left to itself, but that there is willingness to lead. Effective leadership consists of creating structures, steering goal-setting and developing potentials. The

process of goal formulation and implementation planning leads to awareness of the implicit goals and different perceptions among involved stakeholders. In the present context, the challenge is to align the ICT potential with (inter-)organizational processes as well as to redefine processes to exploit the full ICT potential.

Success in this regard depends on how effectively the information management during the cooperation processes can be improved. Important objectives are as follows:

- Direct information access within the organization, across involved organizations and with the affected population;
- Ubiquitous digitalization of information for seamless exchange and processing of information;
- Improved data governance through elimination of uncontrolled data redundancy and increased data quality;
- Shared applications and computing resources across involved organizations;
- A workflow management system for support of information and coordination processes; and
- Process monitoring for optimization of workflows.

Interoperability on the organizational level requires two distinct strategic directions. First, there should be a strategy for ICT infrastructure aimed at optimizing the ICT infrastructure's level of technical maturity. Second, there should be a strategy for ICT exploitation aimed at optimizing the ability of ICT use.

This strategy determines which concrete ICT applications are implemented and operated around the organizational capabilities of involved organizations. These two types of strategies are reciprocally interlinked. If a certain level of maturity is to be obtained in the use of ICT, then an appropriate level of maturity in the IT infrastructure is a prerequisite. The adjustment of the ICT infrastructure must, in turn, follow the strategy for ICT use.

2.4.2.2 Semantic Level

Semantic interoperability is closely related to organizational interoperability. Cooperation improves if a common understanding of processes and activities exists among involved organizations. Interoperability in semantic terms refers to this common understanding and to shared concepts and approaches. From a more technical perspective, semantic data enables optimized service queries, through the automatic selection and interoperation of individual services (i.e., service composition), to deliver targeted and precise information via personalized composite services.

At least three building blocks can be identified – knowledge representation, data extraction, and decision support.

The following section outlines some research directions within each of these three areas

Knowledge Representation

A common language and a shared understanding of concepts and objects are prerequisites for semantically enabling electronic information flows in the context of disaster prevention and response. Developing a common understanding is complicated by the fact that it must be coordinated across all involved stakeholders, ranging from government to emergency response units to the public. The definition of a common vocabulary, therefore, constitutes just one step in this direction. Based on this vocabulary and its categories, communities of interest can be organized, for example, concerning the coordination of tasks or the provision of specific emergency services. Service providers can then identify the community of interest and register their services with it, which includes mapping the generic operations defined by the community with those defined in the service.

Data Extraction

The tedious task of assigning classifications to new data can be vastly reduced through several means.

First, information often already provides a number of qualified metadata.

Second, text-based information can be analyzed using natural language processing techniques for extracting labeled class instances. Based on logic rules, existing classifications from established vocabularies can thus be automatically assigned to text-based information passed along activities around disaster prevention and response.

Third, information extraction based on machine learning and Object-Relation-Object descriptions (e.g., School <has> Fire Alerting System) are techniques to identify logical tuples in data that can be combined with a community approach to supervise the accuracy of results.

The fact that, in principle, metadata is extractable and analyzable offers not only great opportunities for quickly accessing information from multiple heterogeneous sources but also poses challenges concerning the protection of the privacy of involved parties. The concept of the economics of privacy is therefore a useful approach for assessing the trade-off between two goods – privacy and the quality of online services. Often, issues of personal privacy are addressed from the perspective of restricting access to information; however, limiting access to data becomes increasingly difficult as it becomes easier to aggregate data from multiple information sources and to make inferences based on these aggregations. The emphasis of effective privacy protection therefore shifts from restricting access to data towards enabling users to manage their own.

Decision Support

Arguably, there are clear benefits to making existing data and information actionable by aggregating it over multiple sources and by using these aggregations to make inferences to support decision making in disaster prevention and response. For example, biosurveillance utilizes health data to identify outbreaks of disease. The process typically requires daily counts of regional emergency department notifications (e.g., coughing), daily sales of relevant remedies (e.g., cough medicines at pharmacy stores), and daily counts of school absences.

Combining or mashing these various data sources can pinpoint problems much earlier than waiting for each single data stream to pass a critical threshold. Data is aggregated and

relationships and patterns are analyzed, ultimately leading to the conclusion that a disease is spreading. The goal is to alert public officials early and create an opportunity to combat the outbreak as promptly as possible.

In addition, reasoning and simulation can be used to assess decisions and compare decision alternatives. Typically, these approaches involve calculating the value function of a specific policy, based on modeling the transition and observation probabilities, and the reward functions.

Simulations can be used to make policy implications more tractable and to furnish stakeholders with a better grasp of decisions. The area of foresight and simulation in disaster prevention and response, therefore, provides one of the most interesting and promising applications of intelligent and semantically enriched information management.

2.4.2.3 Technical level

This level includes the mechanics of systems technical capabilities and interfaces between organizations and systems. It focuses on communications and computers but also involves the technical capabilities of systems and the resulting mission compatibility or incompatibility between the systems (hardware and software) and data of coalition partners.

At technological level, the benefits of interoperability come primarily from their impacts at the operational and tactical levels in terms of enhancing fungibility and flexibility. (Technology areas include secure voice and data communications ...).

Recognizing the need for systems to work together adequately in a realistic operational context, many organizations have developed definitions designed to facilitate future investments in systems and to harmonize existing programs. But discussions of such technology-based interoperability initiatives can quickly lose their focus on strategic and operational objectives and become arguments about more tractable tactical and programmatic issues.

3 International standards on cooperation

3.1 General Procedures and guidelines

3.1.1 ISO 31000 (AS/NZS 4360)

ISO 31000 is a family of standards relating to risk management codified by the International Organization for Standardization.

ISO 31000:2009 provides generic guidelines for the design, implementation and maintenance of risk management processes throughout an organization. This approach to formalizing risk management practices will facilitate broader adoption by companies who require an enterprise risk management standard that accommodates multiple 'silo-centric' management systems.

The scope of this approach to risk management is to enable all strategic, management and operational tasks of an organization throughout projects, functions, and processes to be aligned to a common set of risk management objectives.

For risk management to be effective, organisations at all levels need to ensure that their risk management program:

1. Creates and protects value
2. Is an integral part of all of the organisation's processes
3. Forms part of decision making
4. Explicitly expresses uncertainty
5. Is systematic, structured and timely
6. Is based on the best available information
7. Is tailored to the organisation
8. Takes human and cultural factors into account
9. Is transparent and inclusive
10. Is dynamic, iterative and responsive to change;
11. Facilitates continual improvement of the organisation

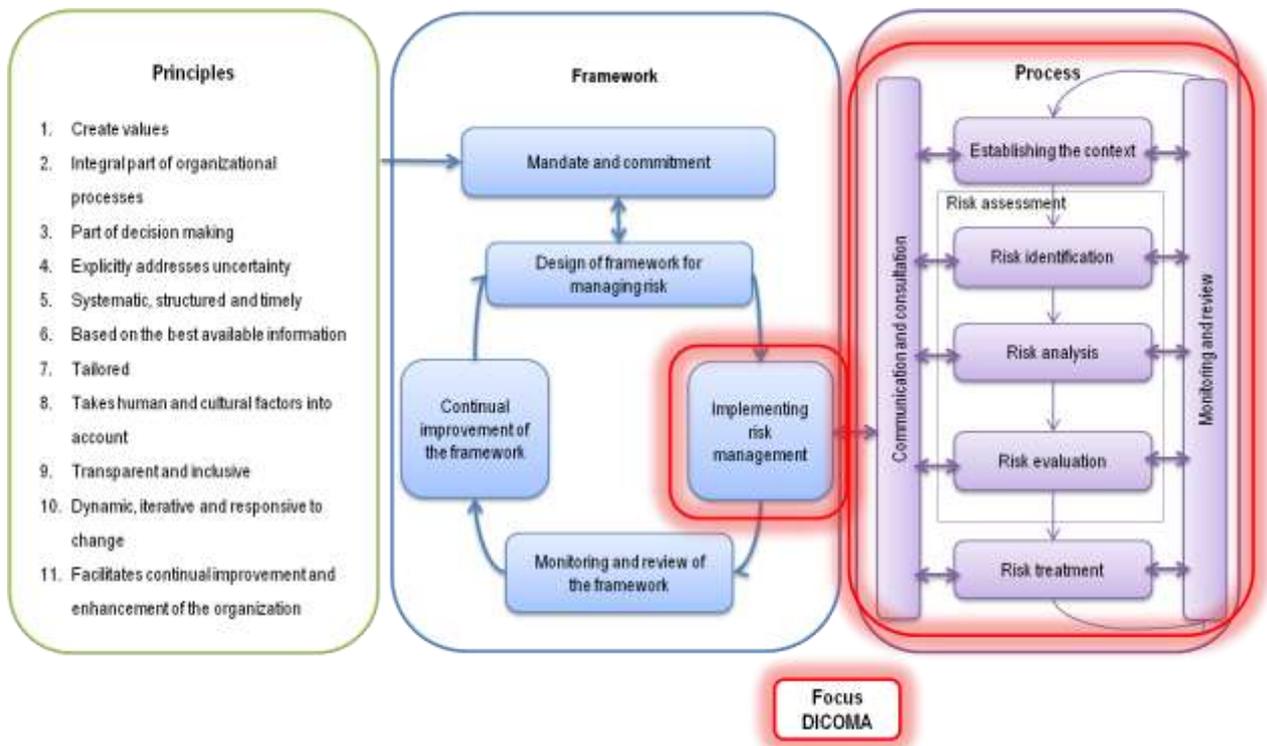


Figure 1: Basic Process for managing the risk

Managing risk

ISO 31000:2009 gives a list in order of preference on how to deal with risk:

- Avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk
- Accepting or increasing the risk in order to pursue an opportunity
- Removing the risk source
- Changing the likelihood
- Changing the consequences
- Sharing the risk with another party or parties (including contracts and risk financing)
- Retaining the risk by informed decision

3.1.2 NFPA 1600

Standard on Disaster/Emergency Management and Business Continuity Programs

This standard establishes a common set of criteria for all hazards disaster/emergency management and business continuity programs, hereinafter referred to as "the program".

This standard provides the fundamental criteria to develop, implement assess, and maintain the program for prevention, mitigation, preparedness, response, continuity and recovery.

3.1.3 Incident Command System (ICS), is a subcomponent of the National Incident Management System (NIMS) in the US

The Incident Command System (ICS) is a standardized, on-scene, all-hazards incident management approach that:

- Allows for the integration of facilities, equipment, personnel, procedures and communications operating within a common organizational structure.
- Enables a coordinated response among various jurisdictions and functional agencies, both public and private.
- Establishes common processes for planning and managing resources.

ICS is flexible and can be used for incidents of any type, scope and complexity. ICS allows its users to adopt an integrated organizational structure to match the complexities and demands of single or multiple incidents.

ICS is used by all levels of government federal, state, tribal and local as well as by many nongovernmental organizations and the private sector. ICS is also applicable across disciplines. It is typically structured to facilitate activities in five major functional areas: Command, Operations, Planning, Logistics and Finance/Administration. All of the functional areas may or may not be used based on the incident needs. Intelligence/Investigations is an optional sixth functional area that is activated on a case-by-case basis.

As a system, ICS is extremely useful; not only does it provide an organizational structure for incident management but it also guides the process for planning, building and adapting that structure. Using ICS for every incident or planned event helps hone and maintain skills needed for the large-scale incidents.

The National Incident Management System (NIMS) identifies concepts and principles that answer how to manage emergencies from preparedness to recovery regardless of their cause, size, location or complexity. NIMS provides a consistent, nationwide approach and vocabulary for multiple agencies or jurisdictions to work together to build, sustain and deliver the core capabilities needed to achieve a secure and resilient nation.

Consistent implementation of NIMS provides a solid foundation across jurisdictions and disciplines to ensure effective and integrated preparedness, planning and response. NIMS empowers the components of the National Preparedness System, a requirement of Presidential Policy Directive (PPD)-8, to guide activities within the public and private sector and describes the planning, organizing, equipping, training and exercising needed to build and sustain the core capabilities in support of the *National Preparedness Goal*.

The *National Preparedness Goal* is a secure and resilient nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to and recover from the threats and hazards that pose the greatest risk. To achieve the Goal, existing preparedness networks and activities, such as NIMS, will be used to improve training and exercise programs, promote innovation and ensure that the administrative, finance and logistics systems are in place to support these capabilities.

3.1.4 ISO/TC 223

ISO/TC 223 develops International standards that aim to increase societal security, i.e. protection of society from and response to incidents, emergencies, and disasters caused by intentional and unintentional human acts, natural hazards, and technical failures. An all-hazards perspective is used covering adaptive, proactive and reactive strategies in all phases before, during and after a disruptive incident. The area of societal security is multi-disciplinary and involves actors from both the public and private sectors, including not-for-profit organizations.

Security challenges to society

Now and in the future, survival of nations and citizens concerns the security of critical functions of society, rather than only the classical focus on the security of the territory. This shift entails the ability of the government and civil society to function, critical infrastructures to be maintained, the democratic ability to govern, and to manifest certain basic values. These abilities are put under pressure during severe crises. In societal security several elements that traditionally have been kept apart are becoming fused: procedures for peace and war merge, internal and external security are interlocked, and the ambitions of enhancing state security and providing citizen safety become blurred.

These are new challenges. They have implications for what (concepts and) tools we need to enhance security, citizens safety and crisis management capacity in an increasingly interdependent and borderless world. And these trans-boundary challenges are not covered by the traditional concept of national civil defence. A new title is suggested with the primary purpose to provide an "umbrella-concept" under which standardization activities can be developed that support the safeguarding of core functions of society as well as providing guidelines for the response and recovery from catastrophic events. Thus, the new title of ISO/TC 223 is "Societal Security" marking a new direction.

Current objectives

Taking the recommendations and assessments made in the Final Report of ISO Advisory Group on Security as a point of departure, the objective of ISO/TC 223 is to assess the need for and develop ISO standards and other deliverables within its chosen scope.

In doing so, it should:

- Ensure that ISO/TC 223 is aware of relevant international policy developments and trends within its scope.
- Ensure cooperation with other standardization groups dealing with security aspects.
- Ensure that as many as possible of relevant stakeholders are aware of and participates in the work of the Technical Committee.

- Ensure that the work is in line with ISO/TMB Implementation Guidance on Global Relevance of ISO Technical Work and Publications.
- Ensure that the work is conducted according to the ISO/IEC Directives.

3.1.5 ISO Guide 73:2009

ISO Guide 73:2009 provides the definitions of generic terms related to risk management. It aims to encourage a mutual and consistent understanding of, and a coherent approach to, the description of activities relating to the management of risk, and the use of uniform risk management terminology in processes and frameworks dealing with the management of risk.

ISO Guide 73:2009 is intended to be used by:

- those engaged in managing risks,
- those who are involved in activities of ISO and IEC, and
- developers of national or sector-specific standards, guides, procedures and codes of practice relating to the management of risk.

For principles and guidelines on risk management, reference is made to ISO 31000:2009.

3.2 National Incident Management System (NIMS)

In the US the National Incident Management System (NIMS), since 2004, addresses interoperability by providing standardized definitions for different software to utilize and prescribes several required features that these systems must incorporate. The NIMS prescribes several required features that these systems must incorporate:

3.2.1 ANSI INCITS 398-2005: Information Technology – Common Biometric Exchange Formats Framework (CBEFF)

This standard describes a set of data elements necessary to support biometric technologies in a common way. These data elements can be placed in a single file used to exchange biometric information between different system components or between systems. The result promotes interoperability of biometric-based application programs and systems developed by different vendors by allowing biometric data interchange.

3.2.2 IEEE 1512-2006: Standard for Common Incident Management Message Sets for Use by Emergency Management Centers

This standard addresses the exchange of vital data about public safety and emergency management issues involved in transportation-related events, through common incident

management message sets. The message sets specified are consistent with the National Intelligent Transportation Systems Architecture and are described using Abstract Syntax Notation One ("ASN.1" or "ASN") syntax. This standard comprises the basic volume of the family of incident management standards, a multi-volume set of documents centered around this Base Standard. Other members of that family include three other companion volumes, specifying incident management message sets for transportation-management-related data exchange and hazardous material and cargo-related data exchange, etc. Collectively, that family of standards shall be referred to as the "1512 Family of Standards." The goal of that family of standards is to support efficient communication for the real-time, interagency management of transportation related events. Those events include incidents, emergencies, accidents, planned roadway closures, special events, and disasters caused by humans or natural events. Those events include any such event that impacts transportation systems or that causes a report to be received by an emergency management system, whether or not the event actually affects a transportation system and whether or not a response is required.

3.2.3 National Fire Protection Association (NFPA) 1221: Standard for Installation, Maintenance, and Use of Emergency Services Communications Systems

This standard covers the installation, performance, operation, and maintenance of public emergency services communication system and facilities.

This standard not is used as a design specifications manual or an instruction manual.

The purpose of this standard are:

- To specify operations, facilities, and communications system that receives alarms from the public.
- To provide requirements for the retransmission of such alarms to the appropriate emergency response agencies.
- To provide requirements for dispatching of appropriate emergency response personnel.
- To establish the required levels of performance and quality of installations of emergency services communications systems.

3.2.4 Organization for the Advancement of Structured Information Standards (OASIS) Common Alerting Protocol (CAP) v1.1

The Common Alerting Protocol (CAP) provides an open, non-proprietary digital message format for all types of alerts and notifications. It does not address any particular application or telecommunications method. The CAP format is compatible with emerging techniques, such as Web services, as well as existing formats including the Specific Area Message Encoding (SAME) used for the United States' National Oceanic and Atmospheric Administration (NOAA) Weather Radio and the Emergency Alert System (EAS), while offering enhanced capabilities that include:

- Flexible geographic targeting using latitude/longitude shapes and other geospatial representations in three dimensions.
- Multilingual and multi-audience messaging.
- Phased and delayed effective times and expirations.
- Enhanced message update and cancellation features.
- Template support for framing complete and effective warning messages.
- Compatible with digital encryption and signature capability.
- Facility for digital images and audio.

Key benefits of CAP will include reduction of costs and operational complexity by eliminating the need for multiple custom software interfaces to the many warning sources and dissemination systems involved in all-hazard warning. The CAP message format can be converted to and from the “native” formats of all kinds of sensor and alerting technologies, forming a basis for a technology-independent national and international “warning internet.”

Applications of the CAP Alert Message:

The primary use of the CAP Alert Message is to provide a single input to activate all kinds of alerting and public warning systems. This reduces the workload associated with using multiple warning systems while enhancing technical reliability and target-audience effectiveness. It also helps ensure consistency in the information transmitted over multiple delivery systems, another key to warning effectiveness.

A secondary application of CAP is to normalize warnings from various sources so they can be aggregated and compared in tabular or graphic form as an aid to situational awareness and pattern detection. Although primarily designed as an interoperability standard for use among warning systems and other emergency information systems, the CAP Alert Message can be delivered directly to alert recipients over various networks, including data broadcasts. Location-aware receiving devices could use the information in a CAP Alert Message to determine, based on their current location, whether that particular message was relevant to their users.

The CAP Alert Message can also be used by sensor systems as a format for reporting significant events to collection and analysis systems and centers.

3.2.5 Organization for the Advancement of Structured Information Standards (OASIS) Emergency Data Exchange Language (EDXL) Distribution Element v1.0

The primary purpose of the Distribution Element is to facilitate the routing of any properly formatted XML emergency message to recipients. The Distribution Element may be thought of as a “container”. It provides the information to route “payload” message sets (such as Alerts or Resource Messages), by including key routing information such as distribution type, geography, incident, and sender/recipient IDs.

Applications of the EDXL Distribution Element:

The primary use of the EDXL Distribution Element is to identify and provide information to enable the routing of encapsulated payloads, called Content Objects. It is used to provide a common mechanism to encapsulate content information.

Design Philosophy:

Below are some of the guiding principles of the Distribution Element:

- Provide an Open Container Model to enable dissemination of one or more emergency messages
- Provide flexible mechanisms to inform message routing and/or processing decisions
- Enable dissemination of messages based on geographic delivery area
- Use and re-use of data content and models developed by other initiatives
- Business process-driven specific messaging needs across emergency professions
- Supporting everyday events and incident preparedness, as well as disasters
- Facilitate emergency information sharing and data exchange across the local, state, tribal, national and non-governmental organizations of different professions that provide emergency response and management services
- Multi-use format - One message schema supports multiple message types (e.g., alert / update / cancellations / acknowledgments / error messages) in various applications (actual / exercise / test / system message.)

3.3 Geographic information and GIS for disaster and emergency management

3.3.1 International Steering Committee for Global Mapping (ISCGM)

The primary purpose of this Committee is to examine measures that concerned national, regional and international organizations can take to foster the development of Global Mapping in order to facilitate the implementation of global agreements and conventions for environmental protection as well as the mitigation of natural disasters and to encourage economic growth within the context of sustainable development.

Relationship to other international efforts, specifications, and standards

The Global Map directly contributes to the development of a global Spatial Data Infrastructure. Formal relationships exist between the ISCGM and the GSDI, the GEOSS, and the One Geology initiatives. Global Map specifications have been written to comply with international standardization agreements, specifically the International Organization for Standardization (ISO) TC 211 recommendations for geographic data.

3.3.2 CEN/ISSS Workshop on 'Information System for Disaster and Emergency Management' - (WS/ISDEM)

CEN provides a European platform for the standardization of products, services, processes and systems across a wide range of sectors.

This Workshop aims to assist organizations providing a message structure for the transfer of information between computer based systems in such a way that it can be reliably decoded. This is done by encoding the information in an XML schema.

3.3.3 Open Geospatial Consortium (OGC) / Risk and Crisis Management (RCM) Working Group

OGC specifications are only part of the mix of standards needed for interoperability among risk and crisis management systems. The OGC's RCM WG works closely with other Working Groups in the OGC, such as the Earth Observation and Natural Resources / Environment WG and the Sensor Web Enablement WG. In addition, the OGC works closely with ISO, OASIS, IETF, W3C and other standards groups.

The OGC has established a Risk and Crisis Management Working Group (RCM WG) to address the global need for better sharing of geospatial information in risk management and emergency management.

The purpose of the RCM WG is to establish requirements and best practices for Web service interfaces, models and schemas for enabling the discovery, access, sharing, analysis, visualization and processing of information related to natural and human-caused risks and the management of related crises. The RCM WG will communicate the benefits of the OGC consensus process and specifications to the risk and crisis management communities and will work to validate and assess OGC's OpenGIS(R) specifications and other interoperability specifications in risk and crisis management scenarios.

3.3.4 Sensor Web Enablement and Disaster Management

Sensors and networks, both wired and wireless, are key components in building distributed sensor networks for monitoring and protecting critical infrastructure such as buildings, airports, railways, bridges, utilities, and water supplies. Such networks also play a role in tsunami and earthquake warning systems, severe weather forecasting and tracking, flood warnings, and environmental health.

The Sensor Web Enablement effort involves OGC members and other standards organizations (e.g. IEEE) in developing standards and best practices to network all types of sensors for Web-

based discovery, access, control, integration, analysis, exploitation and visualization of online sensors, transducers, and sensor data repositories.

Some standards are:

3.3.4.1 OGC® SensorML: Model and XML Encoding Standard

This standard originated from work originally undertaken through the Open Geospatial Consortium's Sensor Web Enablement (SWE) activity. SWE is concerned with establishing interfaces and encodings that will enable a "Sensor Web" through which applications and services will be able to access sensors of all types, and observations generated by them, over the Web. SWE has defined, prototyped and tested several components needed for a Sensor Web, namely:

- Sensor Model Language (SensorML)
- Observations & Measurements (O&M)
- Sensor Observation Service (SOS)
- Sensor Planning Service (SPS)
- SWE Common Data and Services

This standard specifies models and an XML implementation for the SensorML.

3.3.4.2 OGC® SWE Service Model Implementation Standard

The OGC® SWE Service Model Implementation Standard specifies data types and interfaces common to Sensor Web services. It therefore serves as a baseline for the development of such services.

- Specifically this standard.
- Is applicable to all services that provide information from or about sensors.
- Is applicable for uses cases in which sensors need to be managed through service interfaces.
- Specifies how sensor descriptions can be accessed and managed.
- Specifies how historical sensor descriptions can be accessed and managed.
- Establishes the means for inserting and deleting sensors through a common service interface.
- Specifies publish/subscribe functionality for Sensor Web services through definition of recognizable event types, their encodings and association to notification topics.
- Gives guidelines for use of identifiers.

- Provides guidelines on creating an automatic mapping of the data types relevant in a service model from their UML representation to their XML Schema encoding.
- Defines the information required in a SOAP binding to realize the specified service functionality. The SOAP binding specifies WS-Notification to realize Publish/Subscribe service functionality.

3.3.5 OpenGIS® Specifications

The OGC Specification Program provides an effective and well-trusted industry consensus process to plan, review and officially adopt OpenGIS® Specifications for interfaces, encodings and protocols that enable interoperable geoprocessing services, data, and applications. Virtually all of the OGC's current standards work is geared towards open Service Oriented Architectures (SOA). The Specification Program allows members from government, research and industry segments worldwide to do this work together in a collaborative and collegial environment. The OGC and its members promote worldwide use of these standards.

Some standards are:

3.3.5.1 OpenGIS Implementation Specification for Geographic information – Simple feature Access – Part 1: Common architecture

This standard establishes a common architecture and defines terms to use within the architecture.

This standard does not attempt to standardize and does not depend upon any part of the mechanism by which

Types are added and maintained, including the following:

- a) syntax and functionality provided for defining types
- b) syntax and functionality provided for defining functions
- c) physical storage of type instances in the database
- d) specific terminology used to refer to User Defined Types, for example UDT

This standard does standardize names and geometric definitions for Types for Geometry.

This standard does not place any requirements on how to define the Geometry Types in the internal schema nor does it place any requirements on when or how or who defines the Geometry Types.

3.3.5.2 OpenGIS Filter Encoding 2.0 Encoding Standard

This International Standard describes an XML and KVP encoding of a system neutral syntax for expressing projections, selection and sorting clauses collectively called a query expression.

These components are modular and intended to be used together or individually by other standards which reference this International Standard.

This International Standard defines the XML encoding for the following predicates.

- a) A standard set of logical predicates: and, or and not.
- b) A standard set of comparison predicates: equal to, not equal to, less than, less than or equal to, greater than, greater than or equal to, like, is null and between.
- c) A standard set of spatial predicates: equal, disjoint, touches, within, overlaps, crosses, intersects, contains, within a specified distance, beyond a specified distance and BBOX.
- d) A standard set of temporal predicates: after, before, begins, begun by, contains, during, ends, equals, meets, met by, overlaps and overlapped by.
- e) A predicate to test whether the identifier of an object matches the specified value.

This International Standard defines the XML encoding of metadata that allows a service to declare which conformance classes, predicates, operators, operands and functions it supports. This metadata is referred to as Filter Capabilities.

3.3.5.3 OpenGIS Sensor Observation Service

The Open Geospatial Consortium's Sensor Web Enablement (SWE) activities, which have been executed principally through the OGC Web Services (OWS) initiatives under the Interoperability Program, is establishing the interfaces and protocols that will enable "Sensor Webs" through which applications and services will be able to access sensors of all types over networks such as the Internet and with the same standard technologies and protocols that enable the Web. These initiatives have defined, prototyped and tested several foundational components needed for a Sensor Web, namely:

- 1. Observations & Measurements (O&M)** - The general models and XML encodings for sensor observations and measurements.
- 2. Sensor Alert Service (SAS)** – A service by which a client can register for and receive sensor alert messages. The service supports both pre-defined and custom alerts and covers the process of alert publication, subscription, and notification.
- 3. Sensor Model Language (SensorML)** – The general models and XML schema for describing sensors and processes associated with measurement.
- 4. Sensor Planning Service (SPS)** – A service by which a client can determine collection feasibility for a desired set of collection requests for one or more sensors/platforms, or a client may submit collection requests directly to these sensors/platforms.
- 5. Transducer Markup Language (TML)** – General characterizations of transducers (both receivers and transmitters), their data, how that data is generated, the phenomenon being

measured by or produced by transducers, transporting the data, and any and all support data (metadata) necessary for later processing and understanding of the transducer data.

6. Web Notification Service (WNS) – A service by which a client may conduct asynchronous dialogues (message interchanges) with one or more other services. This service is useful when many collaborating services are required to satisfy a client request, and/or when significant delays are involved in satisfying the request.

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5 Acronyms

Acronym	Description
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ICT	Information and Communication Technology
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IEEE	Standard Glossary of Software Engineering Terminology
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GIS	geographic information systems
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CSCW	computer-supported cooperative work
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CBRN	Chemical, Biological, Radiological, and Nuclear
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FR	First Responder
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FT	Field Tests
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FRU	First Responder Unit
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NGO	Non-Governmental Organization
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SaR	Search and Rescue
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SR	System Requirement
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SWAT	Special Weapons And Tactics
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UI	User Interface
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UR	User Requirement
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