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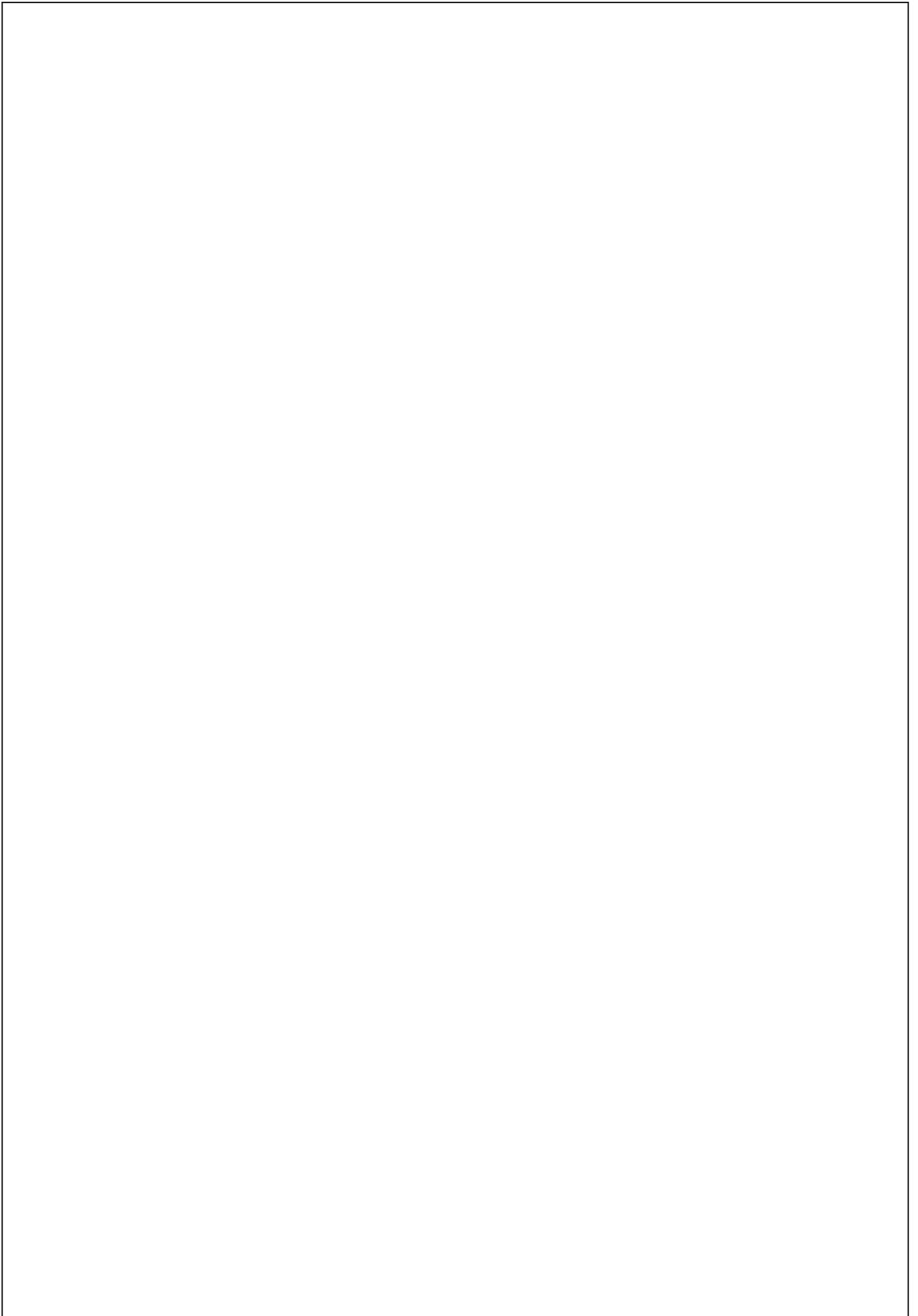
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## **Abstract**

The Disaster Management Profiles are an official MATRIX – deliverable. The information provided by the profiles is twofold. On the one hand, they briefly describe the structure of a country's Civil Protection agencies, and on the other, they outline the status of the hazard and risk assessment progress in the countries that have decided to cooperate with MATRIX.

In order to gather information on the hazard and risk and multi-risk assessment, a questionnaire was developed and submitted to the cooperation partners who are listed in the deliverables "Contacts to National Platforms I-III". The questionnaire is included in Appendix 1.

## **Acknowledgments**

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# 1. Disaster Management Profiles

The Disaster Management Profiles are presented below for the following countries: Austria, Bulgaria, Croatia, Czech Republic, France, Germany, Hungary, Italy, Norway, Poland, Spain, Sweden, United Kingdom and Iceland.

The profiles are mainly based on information extracted from the following sources:

- a) **National progress report on the implementation of the Hyogo Framework for Action (2009-2011) of the corresponding countries (see**

<http://www.preventionweb.net/english/hyogo/progress/reports/?pid:222&pil:1>)

The information provided by the reports was not changed and is presented here in the original phrasing.

Following priorities and indicators of the reports were considered:

Priority for action 2: Identify, assess and monitor disaster risks and enhance early warning

*Indicator 1:* National and local risk assessments based on hazard data and vulnerability information are available and include risk assessments for key sectors.

*Indicator 4:* National and local risk assessments take account of regional / trans boundary risks, with a view to regional cooperation on risk reduction.

Priority for action 3: Use knowledge, innovation and education to build a culture of safety and resilience at all levels

*Indicator 3:* Research methods and tools for multi-risk assessments and cost benefit analysis are developed and strengthened.

and

- b) **Country Profiles presented in the Vademecum for Civil Protection (see**

[http://ec.europa.eu/echo/civil\\_protection/civil/vademecum/index.html](http://ec.europa.eu/echo/civil_protection/civil/vademecum/index.html))

**NOTE:** The Disaster Management Profiles will be updated after all MATRIX-questionnaires have been sent back to DKKV and the MATRIX Workshop planned for the 5/6 July 2012 has been held. They will be integrated into the corresponding country sections. Until then, those that have been provided are presented in Appendices 2-5.

## 1.1 Austria

Austria is organized federally into 9 provinces with their own legislative and administrative bodies and powers.

The Civil Protection, Crisis and Disaster Protection Management of the Ministry of Interior is in charge of disaster management in Austria. It consists of two units: International Civil Protection and Disaster Relief Affairs, and the National Crisis and Disaster Protection Management unit. The body includes disaster management representatives from the provinces, rescue service and others relevant parties. In the event of large scale natural disasters or accidents, disaster management is coordinated by the above mentioned bodies.

The Federal Alarm Center, operating 24/7, acts as a coordination and information node at all levels (from provincial to international).

Disaster management at regional levels is the responsibility of the provinces, while they may be supported by federal means. This is outlined as follows:

“...the provinces have adopted laws to defining the management of interventions at community, district and regional levels, leaving the federal authorities with certain concomitant responsibilities.”

“At regional level, competence is principally incumbent on the federal provinces. The regional alarm centres assume operational responsibility for the coordination of interventions. Under their special tasks, the federal authorities support the provinces in disaster relief operations. Operationally, the provinces rely chiefly on voluntary relief organizations. “ (Source: Vademecum)

At local levels, generally emergency response stays at the district or municipality level, “...while major disasters fall under the competences of regional administrations.” (Source: Vademecum)

The fire and rescue services are mainly voluntary.

### **Hazard and Risk Assessment**

Federal laws with regards to disaster management plans consider the inclusion of descriptions and analyses of hazards which can trigger a disaster. Such descriptions have to

be included into the disaster management plans. Risk analyses also include federal plans I (for example, scenarios for mortality rates arising from national pandemics).

Actually, no generally accepted methodology for risk analyses exists within the context of civil protection. Only for some sectors do standardized methods exist to capture and delineate hazards (e.g. Seveso directive, avalanche barriers).

However, approaches were developed to assess regional risks as, for example, in the context of the “Katarisk: Katastrophen und Notlagen in der Schweiz - eine Risikobeurteilung aus der Sicht des Bevölkerungsschutzes” project<sup>1</sup>.

The “Gefahrenzonenplan” (hazard zone plans) is a laminar survey about the hazards and is the basis for spatial planning, construction and security. The elaboration and update of these plans has a legal framework. The hazards considered in the “Gefahrenzonenplans” are torrents, avalanches, landslides and rock falls. After intensive expert investigations at the location, parcel specific levels of hazards are delineated. These plans are elaborated since 30 years and are provided to municipalities for spatial and construction planning. Different zones are foreseen:

- red zones, new construction is forbidden
- yellow zone, permanent use for the purpose of settlements or transportation not possible. Construction is restricted and only possible when fulfilling certain obligations (a special expert survey is required – so called “Einzelgutachten”)
- blue areas need to be kept free (Vorbehaltsbereiche) for technical or biological protection measures or need to fulfil special kind of cultivation.
- purple areas need to be preserved due to their already existing protective function
- brown areas where except torrent and avalanches additional hazard may occur

The BMLFUW (Forsttechnischer Dienst für Wildbach- und Lawinenverbauung, Bundeswasserbauverwaltung) has developed hazard assessment maps indicating different hazard zones for avalanches and torrents. To prevent earthquake damage to buildings and allow earthquake proofed constructions, scientific and standardized methods for risk analyses exist.

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<sup>1</sup> <http://www.bevoelkerungsschutz.admin.ch/internet/bs/de/home/themen/gefahrdungen-risiken/studien/katarisk.html>

Flood risk zones for floods with return periods of 30, 100, and 200 years were elaborated upon within the framework of the project “Hochwasserrisikozonierung Austria-HORA” for the whole country (see [www.hochwasserrisiko.at](http://www.hochwasserrisiko.at)). Beyond the flood hazard, other hazards are considered and visualized (e.g. windstorms, hail, etc.). For floods for example technical flood protection is not considered in the risk assessment – it is the so called worst-case-scenario.

**Additional Sources:**

Bundesministerium für Inneres (2011): Staatliches Krisen- und Katastrophenschutzmanagement Rechtliche und Organisatorische Grundlagen

[http://hora.gv.at/assets/eHORA/pdf/HORA\\_die.Wildbach\\_Gefahrenzonenplan.pdf](http://hora.gv.at/assets/eHORA/pdf/HORA_die.Wildbach_Gefahrenzonenplan.pdf)

[http://www.hochwasserrisiko.at/assets/eHORA/pdf/HORA\\_Hochwasser\\_Weiterfuehrende-Informationen\\_v3.pdf](http://www.hochwasserrisiko.at/assets/eHORA/pdf/HORA_Hochwasser_Weiterfuehrende-Informationen_v3.pdf)

<http://www.lebensministerium.at/forst/oesterreich-wald/raumplanung/ Gefahrenzonenplan/Gefahrenzonenplan.html>

## 1.2 Bulgaria

Bulgaria consists of 28 provinces. The General Directorate "Fire Safety and Protection of Population Service" consists of 3 main departments (Operational Activities Department, Prevention Activities Department and Administrative Activities Department) and is part of the Ministry of the Interior (Mol). On the regional level, the regions and their governors are in charge of disaster management. Interagency Levels of Command, Control and Coordination are defined for emergencies and disasters at the regional and national levels.

Operational Communication and Information Centers are operational at all 28 regions.

The main tasks of the DG Civil Protection are:

- Development of legal framework.
- Rescue and protection.
- Supervise and develop plans for the protection of the population.
- Training.
- Prevention and mitigation.
- Apply international experience, principles and standards.
- Cooperation with the armed forces.
- Inform the population and governmental authorities when disasters etc. occur.

The civil protection activities are implemented by an Integrated Rescue System when the situation requires two or more parts of the service. At the regional level the governor and at the local level the mayor coordinates the actions at the district or municipality levels. In the event of a disaster at the district level, the governor may but into force the district plan for civil protection. At the local level, the mayor implements preventive measures and informs the population about the situation. The governors exchange information with the Operational Communication and Informational Centre (OCIC), while the mayors may communicate with the operational communication and information centre at the district level. Governors and mayors have to inform the Mol about the management and coordination of rescue and emergency activities.

In Article 52g of the Ministry of Interior Law are defined the tasks of the united Directorate General: (1) Fire Safety and Civil Protection DG is national specialized structure of the Ministry of Interior for ensuring fire safety, rescue and protection in case of disasters according to the terms and regulations of this law and the Disaster Protection Law. The

efficiency of the disaster risk reduction requires close cooperation with other organizations and authorities. The Disaster Protection Law concerns the protection of life, health, environment and property in distress.

Main part of the prevention process is devoted to adequate emergency planning. General Directorate "Fire Safety and Protection of Population Service" develops the national disaster protection plan, which includes plans for disasters such as:

- Floods;
- Earthquakes;
- Snow storms;
- Petrol products spills;
- Fires;
- Industrial accidents;
- Nuclear accidents;
- Biological contamination;
- Terrorist acts.

The DG Fire Safety and Civil Protection also conducts training for external programs (volunteers, units of the Integrated Rescue System, experts from headquarters for coordination in case of disasters), training of the population, organizing and conducting of national and international exercises and conducting scientific and methodological activities. Municipal plans for disaster protection are developed, which include voluntary units formed and trained by the supervision of the municipality authority.

Disaster risk reduction measures are integrated into post disaster recovery and rehabilitation. Procedures are in place to exchange relevant information during hazardous events and disasters and to undertake post events reviews.

The risk reduction principles of the recovery include "build back better" and set out not to recreate risk, and are adopted for the emergency recovery works because financing is provided for sustainable recovery-overhaul, reconstruction or rebuilding performed in compliance of a Detailed or a Technical works design project according The Spatial Development Act.

According to Art. 9 of the Disaster Protection Law:

(1) Planning of disaster protection is carried out at municipal, regional and national level.

(2) For the activity under par.1 executive authorities draw up plans for disaster protection. The Council of Ministers forms the disaster public protection policy; adopt a National Plan for Disaster Protection and a National Action Plan for the carrying out of rescue and emergency recovery activities.

The preventive content of the National Program serves as a nationally owned mechanism for adopting disaster risk reduction measures at all levels. Bulgaria is trying to update its national platform and to include more relevant stakeholders so that it could become multisectoral.

The Chief Directorate Fire safety and Civil Protection has a National Operational Communication and Information center that gathers all data related to hazards and disasters in support of the decision makers. It makes use of the systems RAMO and RODOS, which are integrated systems for emergency management, along with a database for resource security of the country.

The Mol works together with universities, the Bulgarian Academy of Science, and the National Institute of Meteorology and Hydrology on disaster risk reduction related topics

Industrial plants and objects which are a part from the critical infrastructure of the state develop their own emergency plans for actions in the event of an accident. They also develop off-site emergency plans, which become a part of the community emergency plan in municipality.

Regularly organized and held exercises, training sessions and workshops, followed by lessons learnt from previous experience, lead to the improvement of disaster response plans. The national plan for disaster protection is available. Ministers and the other management bodies within their jurisdiction operate in accordance with security protection plans, control the implementation of protection measures in the field regulated or managed by them, maintain stand-by assets and ensure participation of subordinate structures as a part of the Integrated Rescue System (IRS) in accordance with the plans.

The procedures for the exchange of relevant information during hazardous events and disasters are in the competency of the Recovery and Relief Unit that reports to the Chief Directorate Fire safety and Civil protection, Mol.

## **Hazard and Risk Assessment**

The Ministers and various relevant bodies analyze within the range of their competence the possible sources of risks, and implement preventive measures to eliminate and limit the effect of the risk factors, which could cause a disaster.

A manual for risk assessment of potentially dangerous water objects and objects from the chemical industry and atomic energy is available.

The European Council Directive 2008/114/EC of 8 December 2008 on the identification and designation of European critical infrastructures and the assessment of the need to improve their protection has been implemented into Bulgarian law.

## 1.3 Croatia

Croatia consists of 20 counties. The administrative units are in charge of organizing protection and rescue with the competence of local self-government. Civil protection is the responsibility of heads of local and regional governments and at the national level the responsibility of the National Protection and Rescue Directorate (DUZS).

DUZS is responsible for, amongst other things:

- Risk assessments.
- Proposing threat assessments and Protection and Rescue Plans to the Government.
- Collects, directs and analyses data.
- Keeps a unified database on operational forces, resources and measures.
- Coordinates disaster response and disaster preparedness (e.g., notification and alert systems).
- Training.

The Government of Croatia adopted a national rescue and protection plan in 2010. The plan includes the duties and responsibilities of all governmental bodies, institutions and the various parts of the private sector in the event of a disaster.

Croatia has further developed legislation in the area of DRR. National risk analysis and national protection and rescue plans have been developed. EU resolutions are being integrated into DRR related regulations. The National Platform for DRR was established in 2009.

Croatia has active international cooperation with neighbouring countries through bilateral agreements signed with Slovenia, Hungary, Bosnia and Herzegovina, Montenegro, Austria, Poland, Slovak Republic, Russia, France, and Macedonia, as well as through regional initiatives and organizations (Disaster Preparedness and Prevention Initiative) and CMEP SEE (Civil-Military Planning Council for Southeast Europe) and participation in the EU Civil Protection Mechanism.

For specific segments of the DRR community, a good cooperation between the state administration bodies and scientific institutions is already in place, and the goal is to make the cooperation even better and more specific through the National Platform.

There is a protection and rescue system in place involving all state administration bodies and non-governmental organizations, as well as other legal entities performing protection and rescue as part of their regular activities, and which are obliged by the existing legislation to apply measures for disaster risk management.

Disaster preparedness and contingency plans are in place at all administrative levels. They are being constantly supplemented and operations described in them regularly practiced.

### **Hazard and Risk Assessment**

The government has adopted a national risk analysis and national protection and rescue plan. At the local level, new risk assessments are in progress as well as protection and rescue plans. There is risk analysis in place at all levels. At the national level, the protection and rescue system links all state administration bodies and expert institutions, such as Croatian Waters Company, and the State Institute for Radiation and Nuclear Protection. Progress has been made in the implementation of the EU directive SEVESO II (industrial incidents with dangerous substances). Croatia has started the process of the adoption of the ECI (European Critical Infrastructure) Directive.

Data on natural and technological risks are public and available at all levels, and are exchanged with other countries through competent authorities. The said procedure enables making a quality threat assessment at all levels. In some specific types of risk, especially in the environment and flood and fire protection, a progress has-been made at request of local authorities.

In accordance with spatial plans, for every building in construction, there has to be an environmental impact study drafted. Building codes have been applied since 1964. With the earthquake hazard high in Croatia, disaster risk reduction forms part of the spatial planning and is regularly applied.

Disaster risk impact has been incorporated into all development plans on the basis of expected scenarios. Disaster risk impact should be constantly updated and taken into account in the protection and rescue plans.

## 1.4 Czech Republic

The National Security Council (NSC) is the governmental advisory body for security in the Czech Republic. The NSC's president is the Prime Minister. The NSC Vice-President is the Deputy Prime Minister and Minister Foreign Affairs. Other members of the Council are the heads of other ministries (a) the Deputy Prime Minister and Minister for Defence, b) the Minister of the Interior, c) the Minister for European Affairs, d) the Minister for Finance, e) the Minister for Industry and Trade, f) the Minister for Transport, g) the Minister for Health). Four Committees support this body: the Defence Planning Committee, The Civil Emergency Planning Committee, The Foreign Security Policy Co-ordination Committee and the Intelligence Activities Committee. Civil protection is represented at the national level by the Ministry of Interior. At the regional and local levels, regional authorities and municipalities cooperate with the central level.

Civil Protection Plans are controlled by the General Directorate, the Fire Rescue Service (FRS) and the regional FRS. The Integrated Rescue System is important to coordinate different services. "Operational organizations and civil protection are part of DG Fire Rescue Service and operate as one organization" (Source: Vademecum).

DRR principles have been included in so-called flood protection plans with specific responsibilities etc. However, more complex plans related to all types of disaster risk prevention do not exist. On the other hand, floods are the most probable type of disasters in the Czech Republic (over 90% of all disasters).

Local governments have full responsibility for handling disasters within their territory. However, in the case of very severe disasters (catastrophes), when the local governments do not have the means to face all damages and losses - then they can get help from the central government, both financial and operational.

The membership in the National Platform for DRR is voluntary and representatives of institutions and civil society members participate in the activities of platform.

Special projects analyzing recent losses caused by bigger floods have been launched by the government after each such event. These projects have revealed some gaps in the response procedures, and have also made proposals for the future, with the aim of avoiding drawbacks encountered previously.

Due to the frequent reoccurrence of floods, early warning systems for floods have been continuously developed, applied and improved at all administrative levels in a systematic way. The media, such as television or radio, have always been involved in the dissemination of warnings and related information. Some institutions like the Czech Hydrometeorological Institute, Institute for Atmospheric Physics or Water Research Institute of TGM and River Catchment Authorities participate in various projects devoted to flood and disaster reduction. Also, some universities participate in such projects and programs.

The Czech Republic has been very well prepared for flood-type disasters, as the country has been facing such disasters over the last 15 years relatively often. Therefore, a relatively good system of flood warning and flood protection including "flood plans" for each city and community has been developed, applied and step by step improved. Support from crisis management as well as water (Water Act) legislation has been very important. Also, some man-made disasters like nuclear events are well covered and regular exercises are organized (e.g., a recent exercise took place in September 2010). However, some problems could appear with some other types of disaster which occur very rarely.

These plans, procedures and resources for extraordinary events have been systematically created and could be released for the use by the proclamation of a state of emergency by the prime minister and local authorities at the state and regional levels. Operational and communication centres create one system throughout the whole state and their functionality has been checked either by real disasters like floods or by regular exercises at various levels. Special attention has always been given to the potential failure of nuclear power plants.

The Czech Republic has developed a very comprehensive multi-hazard system based on an integrated early warning system connected with a special rescue and response system. The system passed through several tests during real disasters, especially the floods that occurred during the last 15 years. Exercises are also organized on a regular basis. The system defines clear competencies of all stakeholders and also includes the duties of media in such events.

### **Hazard and Risk Assessment**

Multi-hazard assessment has been done for some areas or cities, but not at the level of the whole state. The main problem is that all measures have been developed for floods - which

are the far more frequent disaster type. Much less has been done for other types of disasters which are occurring relatively rarely.

## 1.5 France

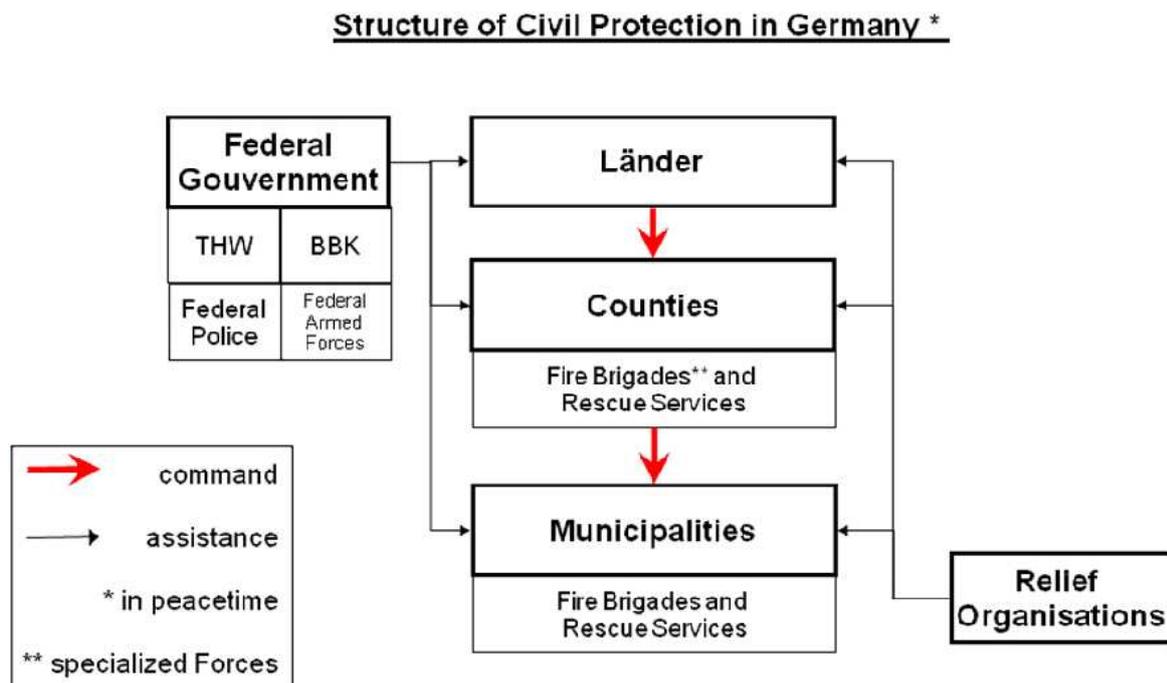
Civil protection in France is organized at all levels:

- National: Ministry of the Interior, assisted by defence senior civil servants and the Interdepartmental Crisis Management Operation Center,
- Zonal: Prefect, Interregional Civil Security Operational Co-ordination Center, assisted by the General Secretariat of the Defence Zone and the Civil Security Zone Headquarters Staff,
- Departmental: Departmental prefect – Departmental Operations Centre of the Fire and Emergency Services..

In event of a disaster, the Directorate of Civil Defence and Security is responsible for Civil Protection at the national level. It has a 24/7 operational centre for monitoring large scale operations and informing the government. Furthermore, operational zonal centres are installed. The task of public safety is shared between the local and national levels. The local levels fulfil preventive and response tasks. Fire services are located in communes or inter-municipal or departmental levels.

## 1.6 Germany

Germany is organized federally in 16 Federal States (Länder), each with a high level of autonomy. Disaster management is in times of peace the task of the Länder. “The states therefore have their own laws regulating the measures for the urgent medical assistance and fire fighting, as well as procedures for disaster managements.” (Source: Vademecum). Below the Länder, the administrative structure encompasses districts, counties and municipalities. In case of a disaster, the lowest level is in charge of managing the situation. “When a disaster affects several districts or exceeds the capabilities of the local government, the next highest hierarchical authority ensures the coordination.” (Source: Vademecum). The government may support disaster management on request through the Federal Agency for Technical Relief, part of the Ministry of the Interior (Mol), the federal police, and armed forces and the Federal Office of Civil Protection and Disaster Assistance within the Mol (see Figure 1).



**Figure 1:** Structure of civil protect in Germany: THW is Federal Agency for Technical Relief, BBK is the Federal Office of Civil Protection and Disaster Assistance.

In order to better cope with severe disasters exceeding the boundaries of a “Land”, an inter-ministerial coordination group may be established.

## Hazard and Risk Assessment

During the course of the implementation of the EU flood directive, the Water Management Act has been amended in 2009. Due to the new law, Federal States must develop risk management plans for flood prone areas. All water bodies have to be considered, including coastlines. The Federal States developed different approaches in creating the risk management plans. According to the new Act, the following tasks have to be finalized by the following deadlines:

- 22.12.2011: temporary assessment of flood risk;
- 22.12.2013: development of flood hazard and flood risk maps;
- 22.12.2015: development of flood risk management plans.

The "Federal Office of Civil Protection and Disaster Assistance" (BBK) published in April 2010 the "Method for Risk Assessment for Civil Protection" (Methode zur „Risikoanalyse im Bevölkerungsschutz). It provides a scenario-based risk assessment methodology based on the area of interest, hazard, occurrence probability and damage magnitude. The method requires the cooperation of federal agencies like the Federal Statistical Office or the Statistical Offices of the Laender and others. a GIS supported addition is under discussion.

The BBK has also developed a guide, "Critical Infrastructure Protection: Risk and Crisis Management" in cooperation with the private sector, government authorities and a research institute (Forschungszentrum Jülich). This guide offers methods for implementing practical risk and crisis management tools in the form of examples and checklists. The guide applies to all sectors and is intended for companies and government authorities as a tool for self-analysis. It is divided into five phases: planning, risk assessment, preventative strategies, crisis management and evaluation. The BBK has likewise developed its approach to provide a scientifically sound and practical method for GIS-aided risk analyses in civil protection that is applicable to all administrative levels. It has also conducted its risk analyses for different hazards and subjects of protection at a national level.

Based on long-term data, the German Meteorological Service (DWD) provides risk maps for certain extreme weather conditions, while the Center for Disaster Management and Risk Reduction Technology (CEDIM) has developed national and country-specific risk assessments for natural hazards (CEDIM Risk Explorer)<sup>2</sup>.

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<sup>2</sup> <http://www.cedim.de/english/riskexplorer.php>

The German insurance industry has sophisticated and detailed methods for risk assessment, including the NATural Hazards Assessment Network (NATHAN: see link) of the Munich Re Group.

National risk assessments are available, with a focus on risk identification and characterisation, in which critical infrastructure is currently identified as the main problem. However, an exhaustive examination and compilation of all available information (e.g., the meteorological data from the DWD) has not taken place due to a scarcity of resources. The Joint Hazard Estimation of the Federal States (Laender) and the Federal Government therefore aims to compile hazards (natural/technological/man-made) exceeding “day-to-day” hazards/crisis situations of national concern, as well as to identify risk hotspots.

Systematic risk assessment databases and vulnerability information regarding fires are lacking. Since responsibilities for fire management (prevention and suppression responsibilities) are divided between different agencies and land owners, a systematic approach for joint inter-agency methodology and procedures for wildfire risk and vulnerability assessment is required and has been initiated by the DWD and the Global Fire Monitoring Centre (GFMC).

The international river commissions, such as the International Commission (IC) for the Protection of the Rhine (ICPR), the IC for the Protection of the Danube (Donau) River (ICPDR), the ICP of the Elbe River” (ICPER), the ICP of the Odra River (ICPO) and the Internationale Kommissionen zum Schutz der Mosel und der Saar (IKSMS), all carry out flood risk assessment appendages to ensure flood control and management in an cooperative approach.

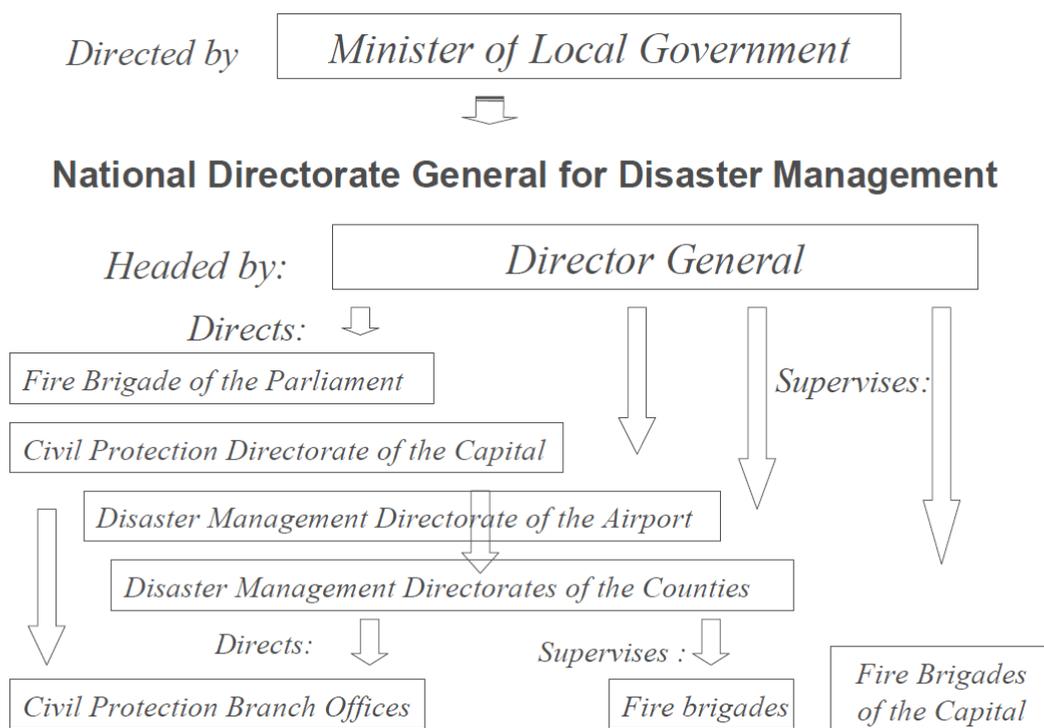
Germany has sophisticated research tools for multi-risk assessments, however, there still remain some basic deficits, such as a lack of quality control mechanisms and few publicly accessible disaster databases. Generally, with the exception of the insurance industry, cost-benefit analyses are not integrated into the assessments and parts of the research are frequently simply research without sufficient practical application or implementation.

Taken together, Germany has the right components for a centralized national multi-risk assessment program, which must be addressed in the next few years by properly utilizing the extensive resources that exist.

## 1.7 Hungary

“The national civil protection authority is the National Directorate General for Disaster Management, supervised by the Ministry of Local Government. The Minister of Local Government is thus responsible for the overall disaster management and is in charge of the management of civil protection and the implementation of related tasks.” (Source: Vademecum). In Hungary, civil protection is organized as follows:

- Ministry of Local Government;
- National Directorate General for Disaster Management (NDGDM);
- County Disaster Management Directorates (19), Civil Protection Directorate of the Capital;
- Civil Protection Branch Offices (99);
- Civil Protection Offices (68).



**Figure 2:** Organisation of civil protection in Hungary.

On the regional level, the chairperson of the county is in charge of disaster management, while on the local level the mayors are responsible for the implementation of civil protection tasks. On the regional and local levels, these tasks include, for example, the deployment and

establishment of civil protection organizations, altering and awareness of the public, drafting civil protection plans, coordination of different services etc. The Governmental Coordination Committee analyses and evaluates forecasted hazards for the purposes of disaster prevention. “It also manages the national assessment of disaster-prone areas.” (Source: Vademecum).

### **Hazard and Risk Assessment**

- “Hazard maps and databases for hazard assessment are available at NDGDM and its regional bodies [...]” (Source: Hungary - National Report in preparation for WCDR 2004)
- Within the framework of a EU project “Management of Natural and Technological Hazards in Accession Countries”, a vulnerability map (forest fires, floods, soil pollution) for Hungary was prepared in 2003.
- Hazard assessment of hazardous establishments/plants are conducted by their operators.
- NDGDM implements the Critical Infrastructure Protection (CIP).

## 1.8 Italy

“The coordination of the national service and the promotion of civil protection activities are undertaken by the Department of Civil Protection - DPC) under the office of the president of the Council of Ministers. The Department of Civil Protection is thus the operative arm of the president of the Council [...]” (Source: Vademecum).

In the case where regions, provinces or municipalities cannot cope with a hazard by their own means, the DPC will support them and coordinates the operations. At the first stage, the task of civil protection is the responsibility of the lowest possible level (municipality), while large scale hazards will be managed by the corresponding higher level, e.g., the region. “Hence the regions are responsible for defining risk forecast and prevention programmes; the provinces are responsible for defining and implementing the related emergency plans; and the municipalities are responsible for the draft municipal emergency plan and the coordination of relief operations on their respective territories.” (Source: Vademecum).

On each level Operational Centers are installed, while the Command and Control Direction at the national level is installed near the area affected by the hazard when it occurs.

### **Hazard and Risk Assessment**

Risk assessments concerning all main hazards are performed at the local, regional and national levels. These activities are carried out according to risk maps updated periodically in order to maintain a thorough knowledge of the distribution, over the whole national territory, of hazards, exposition and vulnerability. The responsibility of ensuring that risk maps and assessments are up-to-date primarily lies with the lower level of the system as local and regional authorities have a better knowledge of the territory. However, in some areas of the country, small communities often do not have the necessary skills and resources to carry out effective risk assessments. This may cause poor development planning, reflecting a lack of knowledge about risk distribution.

Comprehensive risk assessments are carried out primarily under the responsibility and coordination of the regions, provinces and municipalities. Internal transboundary issues are taken into consideration according to the directives and guidelines issued by the National Civil Protection Department, which is responsible for keeping the whole picture up-to-date and for facilitating regional cooperation. By means of the reform performed through the Constitutional Law n. 3 of October 18th, 2001, the Italian regions have acquired the power to

sign international agreements concerning Civil Protection in compliance with the relevant National policies, so regions with international boundaries can set up cross-border agreements with foreign Civil Protection agencies. In the last years, several cooperation programs have been set up to reduce transboundary risks (Source: National progress report on the implementation of the Hyogo Framework for Action (2009-2011), P. 7-10).

## 1.9 Norway

“In the area of national preparedness, the Norwegian Directorate for Civil Protection and Emergency Planning (DSB) is to support the Ministry of Justice and the Police in its coordinating role, develop and maintain national emergency preparedness and response plans and give advice and report to the Ministry and the Government in connection with national crisis management.” (Source: Vademecum).

“At ministerial level, the Ministry of Justice and the Police has a particular responsibility for the coordinating the administration of work on safety, security and emergency planning within the civil sector in general.” (Source: Vademecum). As such, the above mentioned ministry coordinates ministerial responsibilities for preparedness and crisis management.

The DSB implements the following tasks:

- Provision of information and advice to different governmental levels (Ministry, governors, municipalities);
- Vulnerability research as a basis for disaster management;
- Exercises + training of Civil Defence Forces;
- “ [...] National public authority for municipal and inter-municipal fire services, the local electrical safety inspection authorities and the county governors’ emergency preparedness and response work.” (Source: Vademecum).

On a regional scale, the governors are responsible for disaster management. At local levels, the municipalities are in charge of coping with emergency situations. They also develop risk and vulnerability assessments. Fire services, which make up the most important element for handling different types of hazards, are located at the local level. Additional important pillars of Norwegian Civil Protection are: The Norwegian Search and Rescue Service, Military Defence Forces, 2 Rescue Coordination Centers & 54 local rescue centres.

### **Hazard and Risk Assessment**

At the national level every year, the DSB conducts and publicises a national vulnerability and preparedness analysis. At the local level, 96% of the municipalities have conducted local risk and vulnerability analysis over the last four years. The analyses are cross-sectorial and identify vulnerabilities in the society in general and in the different sectors. Responsible authorities on the national level make hazard risk assessments within their field of responsibility, which are followed up by counties and municipalities in their cross-sectorial

risk- and vulnerability assessments. Norwegian authorities are at the moment working on developing a national risk assessment. The aim is to create a cross-sector approach to risk assessments, enabling national authorities to compare different types of hazards and risks. The methodology is inspired by the Dutch and British approach in which different types of events are measured according to their likelihood and consequences, and then put into a matrix. A cross-sector risk matrix will give Norwegian authorities a better understanding of national risks and vulnerabilities, and hence a better basis for prioritizing preparedness resources. The first national risk assessment was published in 2011. It represents a national risk picture based on a risk matrix approach considering plausible worst case scenarios for a set of hazards. The focus of the assessment lays on the consequences and not on the probability of the event. Up to now hazard maps are not part of the assessment. The assessment is meant to be used for a risk sensitive governance in the future.

On the local level all municipalities (over 400) elaborated risk assessments, including hazard mapping. The risk assessment is based on a multiple hazard approach encompassing: communication and supply break downs, critical infrastructures and natural hazards. The assessment is used for emergency planning and planning in general. On the county level there exist regional risk assessments. Through science programs on disaster risk, authorities are playing a role in strengthening their technical and scientific capacities to develop and apply methodologies, studies and models to assess vulnerabilities and the impacts of hazards, including the improvement of regional monitoring capacities and assessments. The research is conducted by several scientific networks involving all the major universities and research establishments (Source: National progress report on the implementation of the Hyogo Framework for Action (2009-2011)).

## 1.10 Poland

At the national level, the Council of Ministers as an executive body is in charge of maintaining public order and the internal security of Poland. “It is empowered to declare the state of emergency.” (Source: Vademecum). It is assisted by the Government Crisis Management Team, which is chaired by the Prime Minister, the Minister of Interior and Administration and the Minister of Defence as deputy chairs. Crisis management may be also executed by the ministers of the interior. The basic elements of the civil protection systems encompass the Council of Ministers, the Government Center for Security and the National Headquarters of the State Fire Service. The Parliament and the President will only act in the case of severe natural disasters. The Government Center for Security and its Director, who is the secretary of the Government Crisis Management Team, coordinates the disaster management. “This includes e.g., a detailed presentation of methods and means of reacting to threats and mitigating their results, gathering information on threats and analyzing collected materials as well as developing conclusions and recommendations for preventing and counteracting threats.” (Source: Vademecum).

An important part of the Polish civil protection is the civil emergency planning (CEP). Each minister has to provide information with respect to the CEP. The CEP’s tasks shall include: “1) Gathering and processing information on capabilities and resources that can be used in crisis situations during states of emergency and during war, 2) Developing procedures, which shall be applied in case of emergencies, 3) Preparing crisis response plans.” (Source: Vademecum).

### **Hazard and Risk Assessment**

“To create multi-hazards and risk assessment the “Informative System in front of Extreme Hazards” will be developed in Poland till 2013. Results of that project conducted by Institute of Meteorology and Water Management allow in future to create the base for multi-hazard risk assessment for local planners.” (Source: HFA)

## 1.11 Spain

The Delegate Commission of the Government for Crisis Situations encompasses the Prime Minister, the Deputy Prime Ministers and the Ministers of Foreign Affairs, Defence, Economy and Finance, and the Interior. “The task of the Crisis Cabinet is to direct and coordinate all actions related to the prevention, control and management of crises. Decision-making responsibilities lie with the Prime Minister.” The Crisis Cabinet is supported or assisted by an inter-ministerial National Civil Emergency Planning Committee (NCEPC). The NCEPC, for example, provides information to the Crisis Cabinet about the state of preparedness for crisis or emergency situations. Civil Protection at the national level is the task of the Directorate General of Civil Protection and Emergencies, under the Minister of the Interior, while the autonomous communities have their own civil protection units and obligations within disaster management. “The relationship between the competent national civil protection authorities and the civil protection organizations, such as the fire brigade, emergency medical services, police are described in the different plans” (Source: Vademecum).

## 1.12 Sweden

The Ministry of Defence has the overall responsibility for Swedish civil emergency planning. The Crisis Management Coordination Secretariat at the Swedish Government Offices coordinates inter-ministerial crisis management. “Following the principle of responsibility, every government office is responsible for planning and handling crises in its own area of responsibility.” (Source: Vademecum).

Civil protection in Sweden is organized at three levels: national, regional and local. Emergencies are supposed to be handled at the lowest possible level (proximity principle), while the next higher level being the County Administrative Boards takes over in the event of larger emergencies or disasters. “In accordance with the principle of proximity, Swedish municipalities at local level have a large degree of autonomy and play an important role in civil defence, civil emergency planning and preparedness as well as accident and disaster prevention through safety in land use planning and accident prevention work in accordance with the Civil Protection Act.” (Source: Vademecum). Public authorities like the Swedish Civil Contingency Agency coordinate and Swedish Road Administration are obliged to “coordinate activities to reduce the vulnerability and enhance the emergency management capabilities of the respective areas [...] and with business, municipalities and county administrative boards.” (Source: Vademecum). They are also obliged to carry out vulnerability and risk assessments in their respective fields. The MSB, the Swedish Civil Contingencies Agency is an important body for cross-sectorial coordination. “The task of the MSB is to enhance and support societal capacities for preparedness and prevention of emergencies and crises. When one does occur, we support the stakeholders involved by taking the right measures to control the situation.” (Homepage MSB)<sup>3</sup>.

The civil protection in Sweden follows three main principles:

- “The responsibility principle: the person who is responsible for an activity under normal conditions should also be responsible for such operations in an emergency.
- The equality principle: to the extent possible, operations should be organized in the same way during emergencies as under normal conditions.
- The proximity principle: emergencies should be handled at the lowest possible level in society.” (Source: Vademecum).

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<sup>3</sup> <https://www.msb.se/en/>

## **Hazard and Risk Assessment**

“The County Administrative Boards have worked systematically to help municipalities identify risks and vulnerability. Significant progress has been achieved already, although most counties have not yet reached the desired stage in their risk and vulnerability work.” (Source: National progress report on the implementation of the Hyogo Framework for Action (2009-2011), P. 12)

“The County Administrative Boards include water authorities that have a database that can be used for national and local risk assessments. This data includes physical, chemical, and biological data from observations, inventories of contaminated land as well as inventories of dams, environmentally hazardous activities conducted and regulated by permit, and documentation of experience from crisis events.” (Source: National progress report on the implementation of the Hyogo Framework for Action (2009-2011), P. 12)

“The County Administrative Boards perform regional risk and vulnerability analyses that can be used as a basis for their own and other players’ prevention, mitigation and emergency preparedness measures. On the local level the risk and vulnerability analysis are required in accordance with law.” (Source: National progress report on the implementation of the Hyogo Framework for Action (2009-2011), P. 12)

“Inventory and mapping of various natural disasters, such as landslide, slope failure, flooding is accomplished. Inventories of beach erosion along coasts and rivers are made including a large project to assess stability in the Göta River which runs through Gothenburg. The Geological Survey of Sweden (SGU) maintains a database containing landslides, ravines, steep sandy river banks and active erosion. In addition the Swedish Geotechnical Institute (SGI) and MSB have databases with similar information. The SGU coordinates a national groundwater monitoring network.” (Source: National progress report on the implementation of the Hyogo Framework for Action (2009-2011), P. 12)

### **Additional Source:**

Homepage MSB: <https://www.msb.se/en/About-MSB/>

## 1.13 United Kingdom

“The Civil Contingencies Secretariat (CCS), based in the Cabinet Office at the heart of central government, is responsible for civil emergency planning in England and Wales. This is a devolved responsibility in Scotland and Northern Ireland. The CCS was established in July 2001 and the administration has since then worked 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” (Source: Vademecum). The government supports the administrations and regions through recourses and coordination, while handling disasters is mainly a task of the local levels and an important principle of English civil protection. “At local level, the UK’s approach to emergency response and recovery is founded on a bottom-up approach in which operations are managed and decisions are made at the lowest appropriate level.” Regional support may be requested while only massive disasters justify coordination at the central government level by the CCS or the relevant lead department nominated by the CCS or the Civil Contingencies Committee (CCC). Emergency plans are used to respond to the emergency. At the local level, local Strategic Coordinating Groups (SCG) are responsible for coordination.

Emergencies affecting the work of different government departments will be coordinated by the Lead Government Department (LGD). Decision making is provided by the Cabinet committee system in the Cabinet Office Briefing Rooms (COBR) chaired by the Prime Minister and key stakeholders. “Within the COBR, a senior decision-making body (the Strategic Group in terrorist incidents and the Civil Contingencies Committee (CCC) for all other emergencies) oversees the government’s response.” (Source: Vademecum). At the regional level, Regional Resilience Teams (RRT) act as a communication hub between the local and central governmental levels. “They are responsible for activating Regional Operation Centers where required, supporting local response and recovery efforts, and ensuring that there is an accurate picture of the situation in their region” (Source: Vademecum).

### **Hazard and Risk Assessment**

“The Government monitors the most significant emergencies that the United Kingdom and its citizens could face over the next five years through the National Risk Assessment (NRA). This confidential assessment is conducted annually and draws on expertise from a wide range of departments and agencies of the government. The National Risk Register (NRR) is

the public version and this 2010 edition has been produced to reflect the latest iteration of the National Risk Assessment.

The National Risk Assessment and National Risk Register are intended to capture the range of emergencies that might have a major impact on all, or significant parts of, the UK. These are events which could result in significant harm to human welfare: casualties, damage to property, essential services and disruption to everyday life. The risks cover three broad categories: natural events, major accidents and malicious attacks” (Source: Web page Cabinet Office: <http://www.cabinetoffice.gov.uk/content/risk-assessment>).

“The UK Government has published a National Risk Register which sets out the assessment of the likelihood and potential impact of a range of different risks that may directly affect the UK. The National Risk Register is designed to increase awareness of the kinds of risks the UK faces, and encourage individuals and organizations to think about their own preparedness. The register also includes details of what the Government and emergency services are doing to prepare for emergencies. The risks are divided into three main areas, natural events, major accidents and malicious attacks. Community Risk Registers currently consider the likelihood and potential impact of a range of hazards occurring in specific areas of England and Wales. They are approved and published by Local Resilience Forums (LRFs) which have been established under the Civil Contingencies Act. They include representatives from local emergency services, and public, private and voluntary organizations. In order to produce the Community Risk Registers, LRFs use a combination of their own judgment about each risk, as well as guidance provided by central government drawn from the National Risk Assessment.”

Regional Resilience Forums (RRFs) play a key role in developing regional risk assessments that provide a judgment of the likelihood and impact of emergencies that could occur in the region. The regional risk assessments build on the local risk assessments produced by LRFs, and equally ensure consistency and co-ordination with the central guidance provided by the Government on the risks facing the UK as a whole. Risk likelihoods are assessed for a five year period so that the risk assessment will support strategic planning for the medium term, informing decisions about capability development. The Civil Contingencies Act places a risk assessment duty on all Category 1 responders. These include: the Local Authorities, Government Agencies, Emergency Services and National Health Service Bodies. Category 1 responders assess risk as often as is necessary to ensure that they are in a reasonable position to maintain and update their emergency plans and to perform the civil protection duties under the Act, including the duty to maintain business continuity plans. As part of the

Local Resilience Forum (LRF) process, Category 1 responders must co-operate with each other in maintaining the Community Risk Register (CRR). The CRR provides an agreed position on the risks affecting a local area and on the planning and resourcing priorities required to prepare for those risks. It is recognized that requiring each Category 1 responder to perform the risk assessment duty in isolation would lead to a wasteful duplication of resources. It is more efficient, and effective, for individual Category 1 responders to fulfil their risk assessment duties by participating in a collaborative exercise that results in a single, collective risk assessment. Category 1 responders also have a statutory duty to publish their risk assessments, to the extent necessary to reduce the impact of an emergency on the community.

Public response to these documents has been generally quiet, although several people have written in suggesting areas that have been missed; e.g., earthquake, landslip etc. These risks do not meet the criteria necessary to make the register.

## 1.14 Iceland

“The Minister of Justice and Human Rights is the supreme authority on matters of civil protection at the national level. The Minister secondly administrative responsibility to The National Commissioner of Police (NCP). The NCP oversees matters such as hazard and risk assessments, mitigation and contingency planning and is responsible for nationwide coordination.” (Source: Vademecum). Local Police Commissioners are the major heads of civil protection at local levels, heading other units. Local Civil Protection Committees are conducting hazard assessment, mitigation and contingency planning.

Iceland’s National Joint Rescue, Command and Coordination Center is represented by the National Commissioner of the Icelandic Police (NCIP) and all other operational organizations. It is situated at the Ministry of Justice and Human Rights. Civil protection activities are coordinated and research is done by the Department of Civil Protection and Emergency Management (DCPEM) which is headed by the NCIP. The NCIP, together with a committee appointed by the Ministry of Justice, runs a coordination and command centre.

“All ministries and national agencies are obliged to have contingency plans for the scope of the responsibilities in civil protection. Six to eight ministers are members of the Civil Protection and Security Council. All agencies are obliged to coordinate their contingency plans and operational procedures with the NCIP and DCPEM. Each agency has the tactical command of their unit under the coordination of the Local Police Commissioner.” (Source: Vademecum).

# Appendix 1 – MATRIX Questionnaire

Questionnaire submitted to all cooperation partners

## MATRIX-QUESTIONNAIRE

### General

Question 1:

Please choose one of two definitions, which are in your opinion more correct or provide us your own definition of multi-risk:

- Multi-risk is a parallel treatment of single hazards while overlaying each risk assessment layer from each considered hazard into a multi-risk matrix. As such the multi-risk matrix then provides an overview of potential multi-risk
  
- Multi-risk is a combination of events, for example, a simultaneous appearance of two or more hazardous events at a location, a sequence of events on a certain timeline. All these events are leading to domino effects, time dependent vulnerability or potentiating of risk
  
- Own definition:

Question 2:

Which authorities and organizations are involved in hazard and risk assessment at the national level in your country?

### Section 1a: Single Hazard Assessment

Question 1:

Please indicate for each hazard the availability of comprehensive hazard assessment. Please answer “yes” or “no” for every hazard.

- Tsunami
- Volcanic eruption
- Earthquake
- Windstorm
- Flood
- Landslide
- Industrial / Technical accident
- Other hazards (e.g. Fire)

Question 2:

For each selected type of hazard please indicate the art of assessment (Including methodology and derived products and tools, scales etc.)

- Tsunami
- Volcanic eruption
- Earthquake
- Windstorm
- Flood
- Landslide
- Industrial / Technical accident
- Other hazards (e.g. Fire)

Question 3:

Do you use results and tools from single hazard assessment to support decision-making processes? Please describe these tools.

Question 4:

Please estimate at which level what kinds of tools are integrated. Please name tools for every level.

- Local
- National
- Regional

Question 5:

Please value the influence of hazard assessment for decision supporting purposes.

- Low
- Medium
- High

Question 6:

Do you apply for your decisions the results received from the following scientific assessments:

- Probabilistic analysis
- Estimations of uncertainties
- Scenario analysis
- Socio-economic and engineering models

Question 7:

- Please explain why you use or not use the above mentioned scientific assessments:
  
- Probabilistic analysis
- Estimations of uncertainties
- Scenario analysis
- Socio-economic and engineering models

### **Section 1b: Single Risk Assessment**

Question 1:

Please indicate for each hazard the availability of comprehensive hazard assessment. Please answer “yes” or “no” for every hazard.

- Tsunami
- Volcanic eruption
- Earthquake
- Windstorm
- Flood
- Landslide
- Industrial / Technical accident
- Other hazards (e.g. Fire)

Question 2:

For each selected type of hazard please indicate the art of assessment (Including methodology and derived products and tools, scales etc.)

- Tsunami

- Volcanic eruption
- Earthquake
- Windstorm
- Flood
- Landslide
- Industrial / Technical accident
- Other hazards (e.g. Fire)

Question 3:

Do you use results and tools from single hazard assessment to support decision-making processes? Please describe these tools.

Question 4:

Please estimate at which level what kinds of tools are integrated. Please name tools for every level.

- Local
- National
- Regional

Question 5:

Please value the influence of hazard assessment for decision supporting purposes.

- Low
- Medium
- High

Question 6:

Do you apply for your decisions the results received from the following scientific assessments:

- Probabilistic analysis
- Estimations of uncertainties
- Scenario analysis
- Socio-economic and engineering models

Question 7:

- Please explain why you use or not use the above mentioned scientific assessments:
- Probabilistic analysis

- Estimations of uncertainties
- Scenario analysis
- Socio-economic and engineering models

## **Section 2: Multi Hazard and Risk Assessment**

Question 1:

Are you aware about any methodologies or tool to assess multi-risk and multi-hazard in your country (City, Region)?

Question 2:

If yes, please describe them.

Question 3:

Do you think that complex multi-risk scenarios, please see the example of Matrix, are useful?

Question 4:

Would you consider the use of these complex multi-risk scenarios within disaster management strategies?

## **Section 3: Future perspectives**

Question 1:

What are the most important general requirements for multi-hazard and multi-risk assessment methods and tools? Please list them.

Question 2:

Which parameters shall be considered?

Question 3:

Which boundary conditions (like administration)?

Question 4:

Which other points shall be taken into account? Please choose at least one.

- Major contents of multi-risk assessment results and tools

- IT
- Timeliness of product availability
- Scope within disaster management

Question 5:

Please provide any detailed information, you consider as important, to at least one of the above mentioned points.

Question 6:

How is multi-risk communicated currently to the decision-making process?

Question 7:

If yes, what shall be improved?

Question 8:

If yes, what shall be avoided?

Question 9:

Do you think that multi-risk assessments have advantages in comparison to the single-risk assessments?

Question 10:

What are these advantages? Please describe them.

Question 11:

Do you think that multi-risk methodology, developed by Matrix project, can be applied in your domain?

Question 12:

If yes, what will be the areas of application?

Question 13:

Are any of the below mentioned barriers relevant for implementation of multi-risk methods?

- technical
- procedural
- political

- financial

Question 14:

If so, please explain the main barriers.

## Appendix 2 – Czech Republic - completed questionnaire

### MATRIX-QUESTIONNAIRE

#### Czech Republic

##### General

Question 1:

Please choose one of two definitions, which are in your opinion more correct or provide us your own definition of multi-risk:

- Multi-risk is a parallel treatment of single hazards while overlaying each risk assessment layer from each considered hazard into a multi-risk matrix. As such the multi-risk matrix than provides an overview of potential multi-risk
- Multi-risk is a combination of events, for example, a simultaneous appearance of two or more hazardous events at a location, a sequence of events on a certain timeline. All these events are leading to domino effects, time dependent vulnerability or potentiating of risk

Own definition:

**Multi – risk determines comprehensive risk from interaction between possible hazards and multi vulnerability (variety of exposed sensitive target). Interaction are represented by cascade events or merely without chronological coincident.**

Question 2:

Which authorities and organizations are involved in hazard and risk assessment at the national level in your country?

**- Ministry of Interior of the Czech Republic**

(Police, Fire rescue service of Czech Republic, Department of security policy - security risks...)

**- Ministry of Defence of the Czech Republic**

(Army, ...)

**- Ministry of Environment of the Czech Republic**

(Nature Conservation Agency of the Czech Republic, Czech Environmental Inspectorate, Company: Forests of the Czech Republic ...)

**- Ministry of Industry and Trade of the Czech Republic**

(CEZ, E.ON, PRE, RWE Energie a.s., ..)

**- Ministry of Agriculture of the Czech Republic** (Czech agrarian chamber, Food insecurity, Veolia, Suez ...)

**- Ministry of Health of the Czech Republic**

**- Ministry of Labour and Social Affairs of the Czech Republic**

**- Ministry of Regional Development of the Czech Republic** (Infrastructure Continuity Planning)

**- Ministry of Foreign Affairs of the Czech Republic**

**- Ministry of Finance of the Czech Republic** (Czech National Bank,..)

**- Ministry of Transport of the Czech Republic** (Road and Motorway Directorate of the Czech Republic, ...)

**- Ministry of Education, Youth and Sports of the Czech Republic**

**- Ministry of Justice of the Czech Republic**

**- Ministry of Culture** (Risks of culture heritage)

## **Section 1a: Single Hazard Assessment**

Question 1:

Please indicate for each hazard the availability of comprehensive hazard assessment.

Please answer “yes” or “no” for every hazard.

- Tsunami – **No**
- Volcanic eruption- **No**
- Earthquake - **No**
- Windstorm – **No comprehensive**
- Flood – **No comprehensive**
- Landslide – **No comprehensive**
- Industrial / Technical accident – **No comprehensive**
- Other hazards (e.g. Fire) – **No comprehensive**

Question 2:

For each selected type of hazard please indicate the art of assessment (Including methodology and derived products and tools, scales etc.)

- Tsunami- **is not current in the Czech Republic**
- Volcanic eruption - **is not current in the Czech Republic**
- Earthquake - **is not current in the Czech Republic**
- Windstorm (**Preliminary Hazard Analysis**)
- Flood (**Preliminary Hazard Analysis, Causes and Consequences Analysis, ..... - HYDRA, - HYDRON,**)
- Landslide (**Preliminary Hazard Analysis , What – if Analysis,**)
- Industrial / Technical accident (**Check list, What – if Analysis, Safety audits, System Hazard assessment, Process Hazard assessment HAZOP, ...- BOSS,- PODS**)
- Other hazards (e.g. Fire)- **WHAZAN, PHAST, HazardReview, ..**

Question 3:

Do you use results and tools from single hazard assessment to support decision-making processes? Please describe these tools:

**- What –If Analysis, FMEA, Fuzzy Set and Verbal Verdict Method, PHA – We use these methods and another for modeling safety of critical infrastructure in water management, energy, food and transport sector.**

Question 4:

Please estimate at which level what kinds of tools are integrated. Please name tools for every level.

- Local – **Local crisis plans, emergency preparedness plans**
- National – **National crisis plans, crisis management**
- Regional- **Regional crisis plans**

Question 5:

Please value the influence of hazard assessment for decision supporting purposes.

- **Low**
  - **Medium**
  - **High**
- (Depends on decision scope and decisions goals)**

Question 6:

Do you apply for your decisions the results received from the following scientific assessments:

- Probabilistic analysis
- Estimations of uncertainties
- **Scenario analysis**
- **Socio-economic and engineering models**

Question 7:

- Please explain why you use or not use the above mentioned scientific assessments:
  
- Probabilistic analysis
- Estimations of uncertainties
- Scenario analysis
- Socio-economic and engineering models
  
- **Probabilistic analysis and Estimations of uncertainties – valid and reliable of data**

### **Section 1b: Single Risk Assessment**

Question 1:

Please indicate for each hazard the availability of comprehensive hazard assessment.

Please answer “yes” or “no” for every hazard.

- Tsunami – **No**
- Volcanic eruption- **No**
- Earthquake - **No**
- Windstorm – **No comprehensive**
- Flood – **No comprehensive**
- Landslide – **No comprehensive**
- Industrial / Technical accident – **No comprehensive**
- Other hazards (e.g. Fire) – **No comprehensive**

Question 2:

For each selected type of hazard please indicate the art of assessment (Including methodology and derived products and tools, scales etc.)

- Tsunami- **is not current in the Czech Republic**
- Volcanic eruption - **is not current in the Czech Republic**
- Earthquake - **is not current in the Czech Republic**
- Windstorm (**Preliminary Hazard Analysis**)
- Flood (**Preliminary Hazard Analysis, Causes and Consequences Analysis, ..... - HYDRA, - HYDRON,**)
- Landslide (**Preliminary Hazard Analysis , What – if Analysis,**)
- Industrial / Technical accident (**Check list, What – if Analysis, Safety audits, Probabilistic Safety assessment, HAZOP, FMEA, FMECA, AFMEA...- BOSS,- PODS**)
- Other hazards (e.g. Fire)- **WHAZAN, PHAST, HazardReview, ..**

Question 3:

Do you use results and tools from single hazard assessment to support decision-making processes? Please describe these tools.

**YES – PSA, PHA, AFMEA, HAZOP, CCA**

Question 4:

Please estimate at which level what kinds of tools are integrated. Please name tools for every level.

- Local
- National
- Regional
- **(Depends on problem complexity)**

Question 5:

Please value the influence of hazard assessment for decision supporting purposes.

- Low
- Medium
- High
- **(Depends on decision scope)**

Question 6:

Do you apply for your decisions the results received from the following scientific assessments:

- Probabilistic analysis
- Estimations of uncertainties
- **Scenario analysis**
- **Socio-economic and engineering models**

Question 7:

- Please explain why you use or not use the above mentioned scientific assessments:
- Probabilistic analysis
- Estimations of uncertainties
- Scenario analysis
- Socio-economic and engineering models
- **Probabilistic analysis and Estimations of uncertainties – valid and reliable of data**

## **Section 2: Multi Hazard and Risk Assessment**

Question 1:

Are you aware about any methodologies or tool to assess multi-risk and multi-hazard in your country (City, Region)?

**- No**

Question 2:

If yes, please describe them.

Question 3:

Do you think that complex multi-risk scenarios please see the example of Matrix, are useful?

**- Yes**

Question 4:

Would you consider the use of these complex multi-risk scenarios within disaster management strategies?

**- Yes**

### Section 3: Future perspectives

Question 1:

What are the most important general requirements for multi-hazard and multi-risk assessment methods and tools? Please list them.

- **Data quality, knowledge and skills**

Question 2:

Which parameters shall be considered?

- **Data availability and training**

Question 3:

Which boundary conditions (like administration)?

- **Public and municipal administration**

Question 4:

Which other points shall be taken into account? Please choose at least one.

- **Major contents of multi-risk assessment results and tools**
- **IT**
- Timeliness of product availability
- **Scope within disaster management**

Question 5:

Please provide any detailed information, you consider as important, to at least one of the above mentioned points.

- **IT – decision support modeling**
- **Major contents of multi-risk assessment results and tools – ability to understanding nature of hazards vulnerability**
- **Scope within disaster management – influence on choice of appropriate multi-risk assessment tool**

Question 6:

How is multi-risk communicated currently to the decision-making process?

- **In present time does not**

Question 7:

If yes, what shall be improved?

**- Information management and decision skills**

Question 8:

If yes, what shall be avoided?

**- miss interpretation cognitive biases**

Question 9:

Do you think that multi-risk assessments have advantages in comparison to the single-risk assessments?

**- Yes**

Question 10:

What are these advantages? Please describe them."

**- Systems and systematic approach**

Question 11:

Do you think that multi-risk methodology, developed by Matrix project, can be applied in your domain?

**- Yes**

Question 12:

If yes, what will be the areas of application?

**- Vulnerability analyses, disaster management, crisis management**

Question 13:

Are any of the below mentioned barriers relevant for implementation of multi-risk methods?

- technical
- procedural
- **political**
- **financial**

Question 14:

If so, please explain the main barriers.

**Financial barriers are result of financial crisis. Politics don't interest in complex societal problems. Departmentalism – responsibility of ministries for single resort, while the multi-risk is spread across departments (different ministries)**

## Appendix 3 – Germany - completed questionnaire

### MATRIX-QUESTIONNAIRE

#### Germany

Answer highlighted in yellow

#### General

Question 1:

Please choose one of two definitions, which are in your opinion more correct or provide us your own definition of multi-risk:

- Multi-risk is a parallel treatment of single hazards while overlaying each risk assessment layer from each considered hazard into a multi-risk matrix. As such the multi-risk matrix than provides an overview of potential multi-risk
- Multi-risk is a combination of events, for example, a simultaneous appearance of two or more hazardous events at a location, a sequence of events on a certain timeline. All these events are leading to domino effects, time dependent vulnerability or potentiating of risk
- Own definition:

Question 2:

Which authorities and organizations are involved in hazard and risk assessment at the national level in your country?

*Currently: Federal Ministry of Interior and other ministries*

*BBK and other federal agencies (interdisciplinary approach)*

#### Section 1a: Single Hazard Assessment

Question 1:

Please indicate for each hazard the availability of comprehensive hazard assessment.

Please answer “yes” or “no” for every hazard.

- Tsunami **no**
- Volcanic eruption **no**
- Earthquake **not yet**
- Windstorm
- Flood **among others activities/results due to the EU-floods directive 2007**
- Landslide **not yet**
- Industrial / Technical accident **see remark\***
- Other hazards (e.g. Fire) **see remark \***

**\* general remark: with respect to the authority at national level and the level of the Länder there will exist different assessments but they are not gathered at national level**

Question 2:

For each selected type of hazard please indicate the **type** of assessment (Including methodology and derived products and tools, scales etc.)

- Tsunami
- Volcanic eruption
- Earthquake
- Windstorm
- Flood
- Landslide
- Industrial / Technical accident
- Other hazards (e.g. Fire)

Question 3:

Do you use results and tools from single hazard assessment to support decision-making processes? Please describe these tools.

**perspectively: classical risk assessment with matrix 6 respective documentation**

Question 4:

Please estimate at which level what kinds of tools are integrated. Please name tools for every level.

- Local
- National
- Regional

## unclear question

Question 5:

Please value the influence of hazard assessment for decision supporting purposes.

- Low
- Medium
- High if carried out properly

Question 6:

Do you apply for your decisions the results received from the following scientific assessments:

- Probabilistic analysis x
- Estimations of uncertainties x x: perspectively
- Scenario analysis x
- Socio-economic and engineering models

Question 7:

- Please explain why you use or not use the above mentioned scientific assessments:
- Probabilistic analysis x
- Estimations of uncertainties x x: comprehensive approach
- Scenario analysis x
- Socio-economic and engineering models

## Section 1b: Single Risk Assessment

Question 1:

Please indicate for each hazard the availability of comprehensive hazard assessment.

Please answer "yes" or "no" for every hazard.

- Tsunami
- Volcanic eruption
- Earthquake
- Windstorm
- Flood

- Landslide
- Industrial / Technical accident
- Other hazards (e.g. Fire)

Question 2:

For each selected type of hazard please indicate the art of assessment (Including methodology and derived products and tools, scales etc.)

- Tsunami
- Volcanic eruption
- Earthquake
- Windstorm
- Flood
- Landslide
- Industrial / Technical accident
- Other hazards (e.g. Fire)

Question 3:

Do you use results and tools from single hazard assessment to support decision-making processes? Please describe these tools.

Question 4:

Please estimate at which level what kinds of tools are integrated. Please name tools for every level.

- Local
- National
- Regional

Question 5:

Please value the influence of hazard assessment for decision supporting purposes.

- Low
- Medium
- High

Question 6:

Do you apply for your decisions the results received from the following scientific assessments:

- Probabilistic analysis

- Estimations of uncertainties
- Scenario analysis
- Socio-economic and engineering models

Question 7:

- Please explain why you use or not use the above mentioned scientific assessments:
- Probabilistic analysis
- Estimations of uncertainties
- Scenario analysis
- Socio-economic and engineering models

## Section 2: Multi Hazard and Risk Assessment

Question 1:

Are you aware about any methodologies or tool to assess multi-risk and multi-hazard in your country (City, Region)?

*Yes, especially for Risk Assessment concerning CI (Critical Infrastructure)*

Question 2:

If yes, please describe them.

Question 3:

Do you think that complex multi-risk scenarios, please see the example of Matrix, are useful?

*Yes, if they generate new, reliable & transparent data provided, added by respective documentation & cost-free to authorities involved in CP (Civil Protection)*

Question 4:

Would you consider the use of these complex multi-risk scenarios within disaster management strategies?

*If 3 as written in the answer : yes*

### Section 3: Future perspectives

Question 1:

What are the most important general requirements for multi-hazard and multi-risk assessment methods and tools? Please list them.

*Transparency*

*Traceability*

*Reliability*

*Added value*

Question 2: *unclear*

Which parameters shall be considered?

Question 3:

Which boundary conditions (like administration)?

*e.g. politics*

Question 4:

Which other points shall be taken into account? Please choose at least one.

- Major contents of multi-risk assessment results and tools
- IT
- Timeliness of product availability
- Scope within disaster management

Question 5:

Please provide any detailed information, you consider as important, to at least one of the above mentioned points.

Question 6:

How is multi-risk communicated currently to the decision-making process?

Question 7:

If yes, what shall be improved?

Question 8:

If yes, what shall be avoided?

Question 9:

Do you think that multi-risk assessments have advantages in comparison to the single-risk assessments?

Question 10:

What are these advantages? Please describe them.

Question 11:

Do you think that multi-risk methodology, developed by Matrix project, can be applied in your domain?

Question 12:

If yes, what will be the areas of application?

Question 13:

Are any of the below mentioned barriers relevant for implementation of multi-risk methods?

- technical
- procedural
- political
- financial

Question 14: If so, please explain the main barriers.

## Appendix 4 – Italy - completed questionnaire

### MATRIX-QUESTIONNAIRE

#### Italy

##### General

Question 1:

Please choose one of two definitions, which are in your opinion more correct or provide us your own definition of multi-risk:

- Multi-risk is a parallel treatment of single hazards while overlaying each risk assessment layer from each considered hazard into a multi-risk matrix. As such the multi-risk matrix than provides an overview of potential multi-risk
- **Multi-risk is a combination of events, for example, a simultaneous appearance of two or more hazardous events at a location, a sequence of events on a certain timeline. All these events are leading to domino effects, time dependent vulnerability or potentiating of risk**
- Own definition:

Question 2:

Which authorities and organizations are involved in hazard and risk assessment at the national level in your country?

**Earthquake and Volcanic eruptions:** DPC-Department of Civil Protection, INGV – National institute of Geophysics and Volcanology, EUCENTRE - European Centre for Training and Research in Earthquake Engineering, RELUIS – University laboratory network for Seismic Engineering.

**Floods and landslides:** In Italy the hydrogeological and hydraulic risk assessment is divided into two different parts: risk assessment in real time and risk assessment in no-real time. Real time activities are carried out by the Civil Protection Department and all the Italian

Regions through the national early warning system, instead the *no-real time* activities are carried out by the Ministry of the Environment and all the River Basin Authorities. The terms *real* and *no-real time* are defined by law, the Directive of the President of the Council of Ministers of 27<sup>th</sup> February 2004 concerning the National Early Warning System. Summarizing, it's possible to define as *real time*, the time period (even months) in which it's possible to put in action civil protection measures to contrast the possible event. These are non-structural measures, like early warning system, emergency measures, civil protection planning. On the contrary, it's possible to define as *no-real time*, the time period (years, decades and centuries) in which it's possible to put in action structural measures to contrast the possible event. These are structural measures, like the construction of levees, for example, and not-structural like territorial and urban planning.

### Section 1a: Single Hazard Assessment

Question 1:

Please indicate for each hazard the availability of comprehensive hazard assessment.

Please answer "yes" or "no" for every hazard.

Tsunami	yes (to be delivered)
Volcanic eruption	yes (to be delivered)
Earthquake	yes
Windstorm	no
Flood	yes
Landslide	yes
Industrial / Technical accident	yes (to be delivered)
Other hazards (e.g. Fire)	yes (to be delivered)

Question 2:

For each selected type of hazard please indicate the art of assessment (Including methodology and derived products and tools, scales etc.)

- Tsunami
- Volcanic eruption
- Earthquake
- Windstorm
- Flood

- Landslide
- Industrial / Technical accident
- Other hazards (e.g. Fire)

### Earthquake

Probabilistic Seismic Hazard Maps (PSHA) in terms of maximum ground acceleration (PGA) and response spectral values for return periods ranging between 30 and 2500 years available for the whole Italian territory with a resolution of 0.05 degrees spacing

Download from: [http://esse1-gis.mi.ingv.it/s1\\_en.php](http://esse1-gis.mi.ingv.it/s1_en.php)

**Flood:** Flood hazard maps are available for all the Italian territory at different scales (1:5.000-1:25.000) issued by each River Basin Authority. The Italian law distinguishes 3 levels of hazard referred to three different return periods: 20-50 years, 100-200years, 300-500 years. The Ministry of the Environment is going to build a platform in which insert flood hazard maps in line with the INSPIRE directive (which was transposed in the Italian law in march 2010).

**Landslides:** Landslides hazard maps are available for all the Italian territory at different scales (1:5.000-1:25.000) issued by each River Basin Authority.

Question 3:

Do you use results and tools from single hazard assessment to support decision-making processes? Please describe these tools.

Seismic Hazard Maps are used for national seismic zoning, building code enforcement, and emergency planning

Floods and Landslides : The major aims of no-real time hazard assessment are: urban planning, infrastructural programs and support of emergency planning.

Question 4:

Please estimate at which level what kinds of tools are integrated. Please name tools for every level.

- Local
  - Seismic Hazard Maps are used integrated with microzoning studies undergoing in the frame of Law n. 77 24/6/09, financing seismic microzoning surveys and vulnerability reduction of strategic and private buildings.
  - Floods and landslides maps: territorial and urban planning and emergency planning
- National
  - Seismic Hazard Maps
  - Floods hazard maps: emergency planning
- Regional

Question 5:

Please value the influence of hazard assessment for decision supporting purposes.

- Low
- Medium
- **High**

Question 6:

Do you apply for your decisions the results received from the following scientific assessments:

- **Probabilistic analysis**
- **Estimations of uncertainties**
- **Scenario analysis**
- Socio-economic and engineering models

Question 7:

Please explain why you use or not use the above mentioned scientific assessments:

- Probabilistic analysis

It's the base of the seismic hazard maps currently used in Italy

It's the base of the flood and landslide hazard maps currently used in Italy

- Estimations of uncertainties
  - Seismic hazard maps have been implemented considering epistemic (logic tree) and aleatoric (standard deviation of the ground motion predictive equations) uncertainties
- Flood and landslide hazard maps have been implemented considering uncertainties related to precipitations, rainfall-runoff models, digital elevation models.

- Scenario analysis

Seismic hazard values, referring to different probabilities of occurrence, are used in the scenario analysis for emergency planning.

Flood and landslides hazard values, referring to different probabilities of occurrence, are used in the scenario analysis for territorial planning and emergency planning.

- Socio-economic and engineering models

Several studies are undergoing but the socio-economic impact due to earthquakes floods and landslides is not yet at a development level adequate to be used in practical applications.

## Section 1b: Single Risk Assessment

Question 1:

Please indicate for each hazard the availability of comprehensive hazard assessment.

Please answer "yes" or "no" for every hazard.

Tsunami	yes (to be delivered)
Volcanic eruption	yes (to be delivered)
Earthquake	yes
Windstorm	no
Flood	yes
Landslide	yes
Industrial / Technical accident	yes (to be delivered)
Other hazards (e.g. Fire)	yes (to be delivered)

Question 2:

For each selected type of hazard please indicate the art of assessment (Including methodology and derived products and tools, scales etc.)

- Tsunami

- Volcanic eruption
- Earthquake
- Windstorm
- Flood
- Landslide
- Industrial / Technical accident
- Other hazards (e.g. Fire)

### **Earthquake**

Seismic Risk Maps in terms of building damage level (0 to 5) expected per year, or expected number of fatalities, homeless people, or unusable dwellings. Maps are produced by different institutions (DPC-Department of Civil Protection, EUCENTRE - European Centre for Training and Research in Earthquake Engineering, RELUIS – University laboratory network for Seismic Engineering) at the scale of the single Italian municipality.

### **Flood and Landslides**

No-real time risk assessment: flood and landslide risk maps are available for all the Italian territory at different scales (1:5.000-1:25.000). The Italian law distinguishes 4 levels of risk: low, medium, high and very high, associated to the 3 hazard levels mentioned above.

Real time risk assessment: flood and landslide risk maps in real time distinguish three levels of severity: ordinary, moderate and high severity. The reference return periods associated are: less than 5 years, between 5 and 20 years, more than 20 years. The Civil Protection Department has implemented a platform in which it's possible to collect all the data needed in real time. In this platform it's possible to share models and data coming from meteorological stations (raingauges, rivergauges, etc) and also it's possible to validate pre-operative products coming from technological innovation. The Civil Protection Department and all the Italian Regions share this platform. Each region decides what to share with local levels. The Civil Protection Department is working to make the platform in line with the INSPIRE directive.

Question 3:

Do you use results and tools from single risk assessment to support decision-making processes? Please describe these tools.

National building code implementation, seismic scenarios and emergency planning, allocation of funds for the seismic risk mitigation (Law n. 77 24/6/09 allocating a budget of

963.504 M€ for microzoning studies and vulnerability reduction of strategic and private buildings).

Flood and landslides: a) allocation of funds for the risk mitigation in terms of infrastructural programs; b) urban management (urban planning) and c) emergency planning. The major aim of real time risk assessment is preparedness and prevention through the construction of scenarios for the Early Warning System and emergency response.

Question 4:

Please estimate at which level what kinds of tools are integrated. Please name tools for every level.

- Local

- Seismic risk scenarios
- Flood and Landslide: territorial planning, emergency planning, risk scenarios for Early Warning Systems (EWS)

National

Seismic risk maps, National Building Code

- Flood risk maps, emergency planning and risk scenarios for EWS
- Landslide: risk scenarios for EWS

- Regional

Question 5:

Please value the influence of risk assessment for decision supporting purposes.

- Low
- Medium
- **High**

Question 6:

Do you apply for your decisions the results received from the following scientific assessments:

- Probabilistic analysis
- Estimations of uncertainties
- Scenario analysis

- Socio-economic and engineering models

Question 7:

Please explain why you use or not use the above mentioned scientific assessments:

- Probabilistic analysis

It's the base of the seismic risk maps currently used in Italy

It's the base of the flood and landslide risk maps currently used in Italy both for real and no-real time risk assessment.

- Estimations of uncertainties

Seismic risk maps have been implemented considering the uncertainties associated to seismic hazard and building vulnerability

Uncertainties associated to hazard and vulnerability were considered in the flood and landslide risk maps currently used in Italy both for real and no-real time assessment (precipitations, rainfall-runoff models, digital elevation models, weather forecast...).

- Scenario analysis

Seismic risk assessment is used in the scenario analysis for emergency planning.

Flood and landslide risk assessments in real and no-real time are used in the scenario analysis for territorial planning, emergency planning and for the EWS risk scenarios which activate the response of the civil protection system directed to face a disaster.

- Socio-economic and engineering models

Several studies are undergoing but the socio-economic impact due to seismic events, floods and landslides is not yet at a development level adequate to be used in practical applications.

## Section 2: Multi Hazard and Risk Assessment

Question 1:

Are you aware about any methodologies or tool to assess multi-risk and multi-hazard in your country (City, Region)?

NO

Question 2:

If yes, please describe them.

Question 3:

Do you think that complex multi-risk scenarios, please see the example of Matrix, are useful?

yes

Question 4:

Would you consider the use of these complex multi-risk scenarios within disaster management strategies?

yes

### Section 3: Future perspectives

Question 1:

What are the most important general requirements for multi-hazard and multi-risk assessment methods and tools? Please list them.

1. Comparability of hazards and risks
2. Joint probabilities (probability of simultaneous or triggered events)
3. Domino effects

Question 2:

Which parameters shall be considered?

??

Question 3:

Which boundary conditions (like administration)?

??

Question 4:

Which other points shall be taken into account? Please choose at least one.

- **Major contents of multi-risk assessment results and tools**
- IT
- **Timeliness of product availability**

- **Scope within disaster management**

Question 5:

Please provide any detailed information, you consider as important, to at least one of the above mentioned points.

??

Question 6:

How is multi-risk communicated currently to the decision-making process?

??

Question 7:

If yes, what shall be improved?

??

Question 8:

If yes, what shall be avoided?

??

Question 9:

Do you think that multi-risk assessments have advantages in comparison to the single-risk assessments?

yes

Question 10:

What are these advantages? Please describe them.

1. The possibility of handling together an event tree where a specific event may trigger another. A perfect example of this has been the 2011 Japan earthquake where a seismic event triggered a tsunami and subsequently a nuclear accident
2. To support cost-effective decision making with respect to mitigation measures within a multi-risk perspective.

Question 11:

Do you think that multi-risk methodology, developed by Matrix project, can be applied in your domain?

Yes if it is demonstrated, as is in the objectives of the MATRIX project, that the multi-type risk assessment provides better results than considering only a single-type of risk at a time.

Question 12:

If yes, what will be the areas of application?

Earthquake

Volcanic eruption

Flood

Landslide

Industrial / Technical accident

Question 13:

Are any of the below mentioned barriers relevant for implementation of multi-risk methods?

- **technical**
- procedural
- **political**
- **financial**

Question 14:

If so, please explain the main barriers.

Technical in dealing joint probabilities of different hazards and political/financial due to the continuous shortening of funds, caused by the global economical crisis and affecting also risk mitigation measures

## Appendix 5 – Norway - completed questionnaire

### MATRIX-QUESTIONNAIRE

#### Norway

##### General

Question 1:

Please choose one of two definitions, which are in your opinion more correct or provide us your own definition of multi-risk:

- Multi-risk is a parallel treatment of single hazards while overlaying each risk assessment layer from each considered hazard into a multi-risk matrix. As such the multi-risk matrix than provides an overview of potential multi-risk
- Multi-risk is a combination of events, for example, a simultaneous appearance of two or more hazardous events at a location, a sequence of events on a certain timeline. All these events are leading to domino effects, time dependent vulnerability or potentiating of risk
- Own definition: The last one

Question 2:

Which authorities and organizations are involved in hazard and risk assessment at the national level in your country?

Every ministries have their own responsibility, and The ministries of Justice and Public Security have some responsibility for coordination.

##### Section 1a: Single Hazard Assessment

Question 1:

Please indicate for each hazard the availability of comprehensive hazard assessment.

Please answer “yes” or “no” for every hazard.

- Tsunami yes
- Volcanic eruption no
- Earthquake no
- Windstorm yes
- Flood yes
- Landslide yes
- Industrial / Technical accident yes
- Other hazards (e.g. Fire) yes

Question 2:

For each selected type of hazard please indicate the art of assessment (Including methodology and derived products and tools, scales etc.)

For all, unless earthquake and volcanic eruption . Risk- and vulnerability analysis as basis for contingency plans and preventions effort.

- Tsunami
- Volcanic eruption
- Earthquake
- Windstorm
- Flood
- Landslide
- Industrial / Technical accident
- Other hazards (e.g. Fire)

Question 3:

Do you use results and tools from single hazard assessment to support decision-making processes? Please describe these tools.

Risk- and vulnerability analysis

Question 4:

Please estimate at which level what kinds of tools are integrated. Please name tools for every level.

Risk- and vulnerability analysis used at every levels in Norway

- Local
- National
- Regional

Question 5:

Please value the influence of hazard assessment for decision supporting purposes.

- Low x
- Medium x
- High

Question 6:

Do you apply for your decisions the results received from the following scientific assessments:

- Probabilistic analysis x
- Estimations of uncertainties
- Scenario analysis x
- Socio-economic and engineering models

Question 7:

- Please explain why you use or not use the above mentioned scientific assessments:
- Probabilistic analysis Used in Norway as basis for decisions and planning
- Estimations of uncertainties
- Scenario analysis At national level for prioritize resources and for planning
- Socio-economic and engineering models

### **Section 1b: Single Risk Assessment**

The answer is the same as for 1 a

Question 1:

Please indicate for each hazard the availability of comprehensive hazard assessment.

Please answer “yes” or “no” for every hazard.

- Tsunami

- Volcanic eruption
- Earthquake
- Windstorm
- Flood
- Landslide
- Industrial / Technical accident
- Other hazards (e.g. Fire)

Question 2:

For each selected type of hazard please indicate the art of assessment (Including methodology and derived products and tools, scales etc.)

- Tsunami
- Volcanic eruption
- Earthquake
- Windstorm
- Flood
- Landslide
- Industrial / Technical accident
- Other hazards (e.g. Fire)

Question 3:

Do you use results and tools from single hazard assessment to support decision-making processes? Please describe these tools.

Question 4:

Please estimate at which level what kinds of tools are integrated. Please name tools for every level.

- Local
- National
- Regional

Question 5:

Please value the influence of hazard assessment for decision supporting purposes.

- Low
- Medium
- High

Question 6:

Do you apply for your decisions the results received from the following scientific assessments:

- Probabilistic analysis
- Estimations of uncertainties
- Scenario analysis
- Socio-economic and engineering models

Question 7:

- Please explain why you use or not use the above mentioned scientific assessments:
  
- Probabilistic analysis
- Estimations of uncertainties
- Scenario analysis
- Socio-economic and engineering models

## **Section 2: Multi Hazard and Risk Assessment**

Question 1:

Are you aware about any methodologies or tool to assess multi-risk and multi-hazard in your country (City, Region)?

No

Question 2:

If yes, please describe them.

Question 3:

Do you think that complex multi-risk scenarios, please see the example of Matrix, are useful?

Yes

Question 4:

Would you consider the use of these complex multi-risk scenarios within disaster management strategies?

Not sure

### **Section 3: Future perspectives**

Question 1:

What are the most important general requirements for multi-hazard and multi-risk assessment methods and tools? Please list them.

A simple guidelines

Question 2:

Which parameters shall be considered?

It must secure that most all relevant possible/multi risk be covered in the method/guide

Question 3:

Which boundary conditions (like administration)?

Municipality administration

Question 4:

Which other points shall be taken into account? Please choose at least one.

- Major contents of multi-risk assessment results and tools
- IT x
- Timeliness of product availability x
- Scope within disaster management

Question 5:

Please provide any detailed information, you consider as important, to at least one of the above mentioned points.

IT systems must be simple to use, easy to understand and have a low costs. This is important for implementation in Norwegian municipalities.

Question 6:

How is multi-risk communicated currently to the decision-making process?

We do not have a specific multi risk analysis/assessment in Norwegians municipalities. We have a general risk analysis method.

Question 7:

If yes, what shall be improved?

Question 8:

If yes, what shall be avoided?

Question 9:

Do you think that multi-risk assessments have advantages in comparison to the single-risk assessments? Yes

Question 10: What are these advantages? Please describe them.

It will secure that complicated risk, and risk with domino effect will be taken in to account.

Question 11:

Do you think that multi-risk methodology, developed by Matrix project, can be applied in your domain?

Not sure

Question 12:

If yes, what will be the areas of application?

Question 13:

Are any of the below mentioned barriers relevant for implementation of multi-risk methods?

- Technical x
- procedural
- political

- financial x

Question 14:

If so, please explain the main barriers.

In the mostly Norwegian municipalities is activity in risk assessment a left hands work. If the methodologies is complicated to use and implementation is costly, it will be difficult.