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Signature

Date


Reviewer: 01.2013



Signature

Date

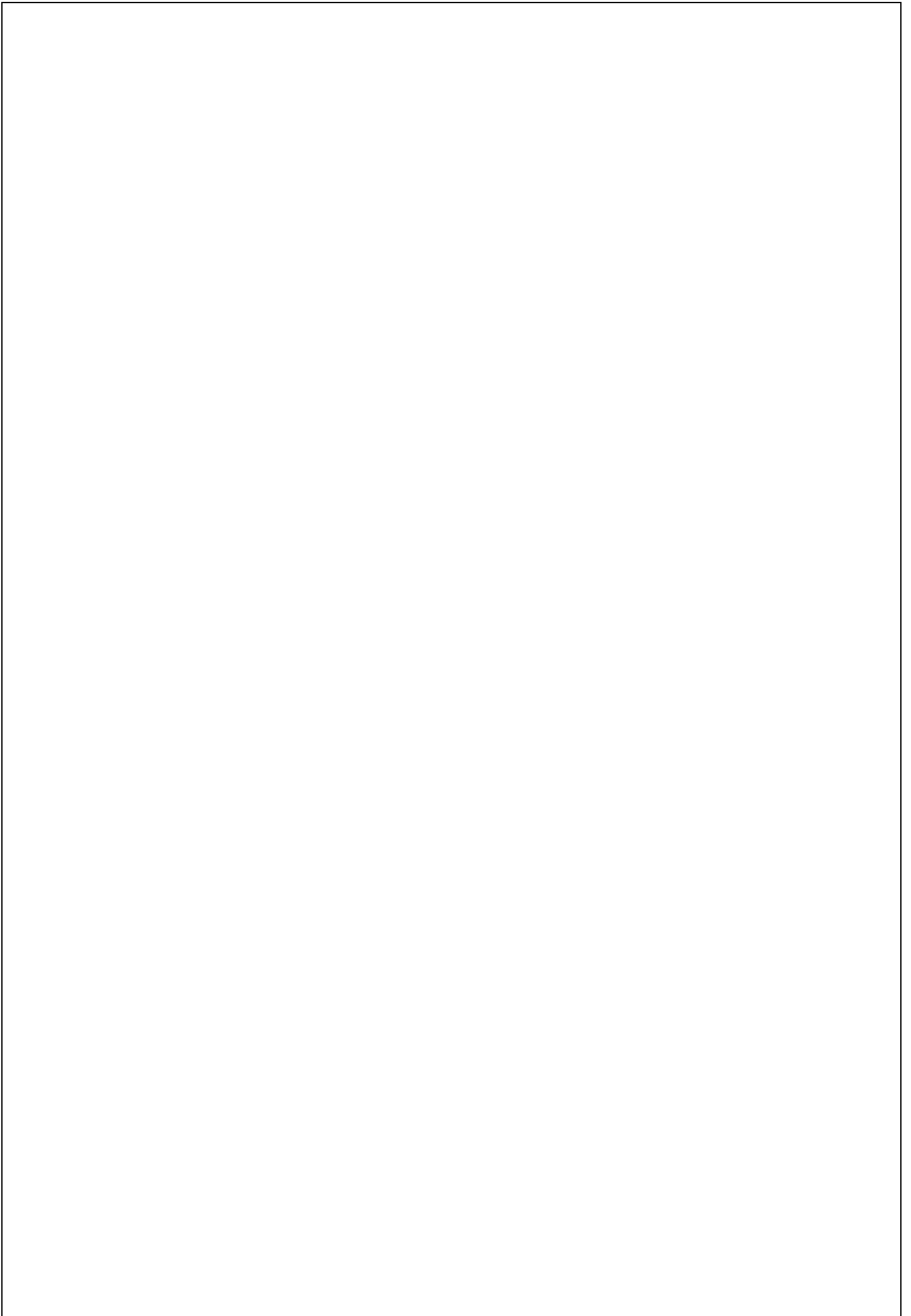
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Signature

Date

Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	



Abstract

The contacts with selected National Platforms for Disaster Reduction and Hyogo Framework for Action Focal Points have been consolidated in a way that a workshop was organised and attended by numerous Cooperation Partners (CPs). In order to assess the status of hazard and risk assessment in Europe, a questionnaire was prepared and the results analysed by members of the MATRIX consortium (WP8). The CPs and MATRIX agreed to publish a joint paper on the status of multi-risk in Europe.

Acknowledgments

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1 Contacts to National Platforms IV

In order to foster the cooperation with the National Platforms, HFA Focal Points and other selected organisations acting as Cooperation Partners with MATRIX, a workshop was organised and held in Bonn on 5/6 July, 2012, at the premises of DKKV. The Cooperation Partners - represented by the above mentioned groups and listed in Appendix 1 - volunteered to cooperate with MATRIX in order to discuss and support the development of multi-risk methodologies and tools from a perspective of a potential user together with MATRIX team.

1.1 STATUS OF COOPERATION

The actual status of cooperation is displayed in Table 1, Appendix 1 and has not changed since D8.10 – Contacts to National Platforms III.

1.2 WORKSHOP

The workshop held in Bonn provided an excellent basis for exchanging views, receiving feedback and understanding better needs from the Cooperation Partners with regards to multi-risk and MATRIX. The participants were eager to learn about MATRIX and the tools under development were presented during the second day (MATRIX CITY and the Decision Support System).

Five main results may be viewed as an important step towards increased interaction with and assistance from the potential end-users.

- The developers of the MATRIX IT tools were invited to present their systems at the civil protection premises of different countries (amongst others, the Italian Civil Protection, Federal Office of Civil Protection and Disaster Assistance and the Croatian National Platform).
- The Cooperation Partners agreed to publish a joint paper out of the workshop.
- The Cooperation Partners expressed their interest in a follow-up workshop presenting the MATRIX progress.
- The Italian Civil protection, as the leader of the Euromed Programme on Prevention, Preparedness and Response to Natural and Man-made Disasters¹, invited MATRIX to a workshop on “Multi-hazard risk assessment in urban environment” which will take place in Lisbon on 17-19 October 2012. A particular emphasis will be given to MATRIX during this event.
- Even if currently multi-risk approaches are barely used among the selected partners, there is an obvious and strong interest in integrating multi-risk within their own professional areas (e.g., regional planning, determination of joint probabilities for cascading hazard etc.).

¹ <http://www.euromedcp.eu/>

The minutes of the stakeholder workshop held in Bonn are attached to this document and have been circulated to the participant for comments (see Appendix 2).

A feedback sheet (see Appendix 3) was prepared and submitted to the cooperation partners after the workshop in order to assess the following:

- quality of contents
- organisational issues
- usefulness of the workshop for the organisations work
- changes in perception of multi-risk

The results of the feedback sheets will be presented in D8.12 Contact to National Platforms V and utilised in the context of D8.15 Platforms and MATRIX community: Performance evaluation of interaction between platforms and MATRIX community

1.3 QUESTIONNAIRE – STATUS OF HAZARD AND RISK ASSESSMENT IN EUROPE

Based on the questionnaires prepared and submitted before the workshop to the Cooperation Partners, an analysis of the status of the hazard and risk assessment with a focus on multi-risk was conducted. The results of the analysis were presented during the workshop to the participants. This analysis comprises the results received from 8 European countries. The full analysis is attached to the document (see Appendices 4 and 5).

1.4 CONCLUSION AND OUTLOOK

There is a remarkable interest in the MATRIX project and the topic of multi-risk among the European Cooperation Partners. This is reflected in the commitment of the Cooperation Partners to a joint paper, the numerous invitations to present MATRIX at the premises of the national civil protection authorities and their interest in follow-up MATRIX activities. The MATRIX team will use this momentum in order to intensify the interaction by visiting and presenting MATRIX tools during the upcoming event organised by the Italian Civil Protection and will follow-up upon the invitations of the representatives to present the MATRIX tools.

Following the request of the participants, MATRIX envisages a follow-up workshop at the end of the project, probably as part of its final meeting, in order to present the final results to the community.

Appendices

Appendix 1 - Status of cooperation as of 18.09.2012

Country	Status of cooperation	Organisation	Contact persons	Position
Austria	Confirmed cooperation	Federal Ministry of Agriculture, Forestry, Environment and Water Management	Mr PICHLER Andreas and Mr JACHS, Siegfried (Federal Ministry of the Interior in CC)	Austrian Service for Torrent and Avalanche Control
Bulgaria	Cooperation not confirmed	Ministry of Interior - DG Fire Safety and Protection of the Population	Ms STOYANOVA Gloria	Expert - International Cooperation Unit
Czech Republic	The National Committee for Natural Disaster Reduction asks to be informed about the projects process. Detailed cooperation activities need to be discussed with Mr Obrusnik	Czech National Committee for Natural Disaster Reduction	Mr OBRUSNIK Ivan	Former Director CHMI
Croatia	Confirmed cooperation	National Protection and Rescue Directorate	Ms BILJAKOVIC Katica and Ms IVANCAN-PICEK Branka	Scientific advisor at Institute of Physics, Zagreb; Representative of the Ministry of Science in CCPDR (Committee of Croatian Platform for Disaster Reduction)
France	Confirmed cooperation	Ministère de l'Écologie, de l'Énergie, du Développement durable et de la Mer	Mr GERARD François	Former Chef du bureau information préventive, coordination et prospective MEEDDAT / DGPR / SRNH

				/ bipcp
Germany (BBK)	Confirmed cooperation	German Committee for Disaster Reduction and Federal Office of Civil Protection and Disaster Assistance (BBK)	Ms CLEMENS-MITSCHKE Angela & GEIER Wolfgang	Head of Departement II.1 - General policy issues of civil protection (population protection); risk management; emergency preparedness
Hungary	Cooperation not confirmed	National Directorate General for Disaster Management - Ministry of Interior	Ms RAJICIC Ágnes	Senior Desk Officer - Department for International Relations and Legal Affairs
Italy	Confirmed cooperation	Civil Protection Department	Mr SABETTA Fabio and Mr ROSSI Luca	Department - Seismic and Volcanic Risk
Norway	Confirmed cooperation / sharing of some expertise and participation in MATRIX workshops	Directorate for Civil Protection and Emergency Planning	Mr HOGVOLD Dag Olav and Mr. LARSEN Nils	Senior adviser - Research and analysis
Poland	Confirmed cooperation	Institute of Meteorology and Water Management Branch Office in Cracow (IMGW)	Mr WALCZYKIEWICZ Tomasz	Division of Water Management
Spain	Cooperation not confirmed	Dirección General de Protección Civil y Emergencias	Mr LAHORE Juan Pedro	Director
Sweden	Swedish NP proposes to contact the following institutions and bodies instead, to act as	Swedish Civil Contingencies Agency (MSB)	Ms LINDAHL OLSSON Mette and Ms POSTGARD	Head of Natural Hazards & Critical Infrastructure Section - Risk &

	cooperation partners: 1. Center for climate and safety 2. Centre for Natural Disaster Science 3. Department of Fire Safety Engineering and systems 4. Municipality of Karlstad		Ulrika	Vulnerability Reduction Department
Sweden	Confirmed cooperation	Department of Fire Safety Engineering and systems	Mr PETERSEN Kurt	Prof.
Sweden	See → Center for Climate and Safety	Center for Natural Disaster Science	Mr HALLDIN Sven	Prof.
Sweden	Confirmed cooperation	Center for Climate and Safety	Mr NYBER Lars	Coordinator
UK	Cooperation not confirmed		Mr BARNES Steven	
Iceland	Cooperation not confirmed			
CoE	Confirmed participation and the sharing of expertise with MATRIX	European and Mediterranean Major Hazards Agreement (EUR-OPA) Council of Europe	Mr FERNÁNDEZ-GALIANO Eladio	Executive Secretary
EC (DE LANNOY Thomas)	Confirmed participation and the sharing of expertise with MATRIX	European Commission - DG - ECHO Humanitarian Aid and Civil Protection - Unit ECHO C3 Civil	Mr DE-LANNOY Thomas	

		Protection - Disaster Response		
ISDR Europa	Confirmed participation in the area of dissemination and participation in workshops	United Nations International Strategy for Disaster Reduction, UNISDR	Ms DANNENMANN Stefanie	Programme Officer

Appendix 2 – Minutes MATRIX Stakeholder Workshop

Minutes of the MATRIX Stakeholder Meeting Bonn 5./6. July 2012

Participants:

Participant	Organisation
Mr. PICHLER Andreas	Federal Ministry of Agriculture, Forestry, Environment and Water Management, Austrian Service for Torrent and Avalanche Control
Ms. BILJAKOVIC Katica	National Protection and Rescue Directorate
Mr. GERARD François	Ministère de l'Écologie, de l'Énergie, du Développement durable et de la Mer
Ms. LENZ Susanne	Federal Office of Civil Protection and Disaster Assistance (BBK)
Mr. SABETTA Fabio	Civil Protection Department, Department - Seismic and Volcanic Risk
Mr. LARSEN Nils Ivar	Directorate for Civil Protection and Emergency Planning
Mr. NYBER Lars	Center for Climate and Safety
Ms. DANNENMANN - DI PALMA Stefanie	United Nations Office for Disaster Reduction Europe
Mr. WENZEL Friedemann	Karlsruhe Institute of Technology (KIT)
Mr. KHAZAI Bijan	Karlsruhe Institute of Technology (KIT)

Mr. FLEMING Kevin	German Research Centre for Geosciences (GFZ)
Mr. MIGNAN Arnaud	ETH Zurich, Swiss Seismological Service (SED)
Ms. KOMENDANTOVA Nadejda	International Institute for Applied Systems Analysis (IIASA) Risk, Policy and Vulnerability Program
Mr. MRZYGLOCKI, Roger	German Committee for Disaster Reduction (DKKV)
Mr. ZENTEL, Karl- Otto	German Committee for Disaster Reduction (DKKV)
Mr. NADIM, Farrokh	International Centre for Geohazards (ICG)
Mr. DIENEL, Hans-Liudger	Center for Technology and Society Berlin University of Technology

Agenda:

Thursday July 5, 2012

Invitation and Round of Introduction

General Introduction & Workshop Objectives (F. Wenzel)

Synthesis of the Questionnaires (R. Mrzyglocki)

Discussion

Data and Information – precondition for hazard and risk assessment (K. Biljakovic)

Hazard and Risk mapping concepts and their level of practical appliance (A. Pichler)

Risk mapping concepts and their level of practical appliance (N. I. Larsen)

Seismic Risk Assessment and Reduction (F: Sabetta,)

MATRIX Concepts (K. Fleming)

Friday July 6, 2012

Presentation of the Tool MATRIX City (A. Mignan)

Discussion

Presentation of the Tool Decision Support and Expert Knowledge (B. Khazai)

Discussion

Working Paper (F. Wenzel)

Conclusions and General Discussion

General Introduction and Workshop Objectives:

F. Wenzel referred to the EC communication (2009) on multi-risk assessment as a starting point for future European activities in the field of multi-risk assessment for civil protection and other state agencies. In parallel to this initiative, the EC supports research efforts. One of these efforts is the project MATRIX, an acronym formed from 'New Multi-Hazard and Multi-Risk Assessment Methods for Europe'. MATRIX focuses on multi-risk assessment methodologies and includes an interaction process with stakeholders as a relevant part of its program.

Main objectives and questions were specified as:

- Identify requirements for information technology tools for multi-risk assessment from a stakeholder perspective.
- Which evaluation tools (decision support tools) are necessary and useful for evaluating and ranking various loss components in multi-risk assessment?

As outcome of the workshop a joint working paper is anticipated with input from workshop participants that (a) reflects the state of multi-risk assessment in Europe and (b) addresses the questions of the workshop.

All presentations are available on the internet via

<http://www.dkkv.org/DE/events/default.asp?h=35>

Therefore, the minutes only discuss the most relevant issues of each presentation.

Synthesis of Questionnaires:

R. Mrzyglocki presented the results of the questionnaire that DKKV has passed to Cooperation Partners. Eight questionnaires were returned and evaluated in the presentation. The purpose of the questionnaire was the assessment of the current status of hazard and risk assessment in general terms within the EC and specifically the thoughts on multi-hazard and multi-risk items.

A common opinion was that the results of risk assessments are generally less needed than reliable hazard assessment products. But overlaying hazard maps and asset maps is common method used in France. This method is used in the context of Risk Prevention Plans for preliminary risk assessment purposes at the municipal level. Probabilistic analysis and scenario analysis are widespread. In particular scenario analysis seems to be state-of-the-art. Uncertainties are difficult to address because adequate methodologies and sometimes reliable data are not available.

50% of the responders were aware of methodologies and tools to assess multi-risk. Although there is progress at the conceptual level, the general conclusion is that multi-risk analysis is barely integrated into the decision making processes.

Presentations from the stakeholders

Katica Biljakovic (Croatian National Platform for Disaster Reduction) Data and Information – Precondition for hazard and risk assessment

This presentation focused on the specific circumstances of risk and hazard assessment in Croatia, characterized by the only recent termination of the civil war. Because of this, specific hazards such as forest fires caused by mines left over from the war and explosion of ammunition including the pollution problems associated with that play a specific role. The economic losses due to hazard in Croatia are significant (130 Mio. Euros in 2008 and more than 400 Mio Euros in 2007). Most of the losses (statistics covering 1980 to 2002) are caused by hydro-meteorological disasters, including droughts with a major portion (38%) followed by storm and hail (20%). A legal basis for hazard assessment and response and protection has been developed by a law passed in 2004. Funding for research on natural hazards and risks is underdeveloped.

Andreas Pichler (Lebensministerium, Österreich) Hazard and Risk Mapping Concepts and their Level of Practical Appliance – Austrian Perspective

Landslides and other alpine natural hazards but also floods are the dominant causes for losses in Austria. Two thirds of the Austrian territory is threatened by torrents and avalanches. This is particular relevant as the threatened areas are frequently used for tourism. Hazard maps are only available for floods whereas maps for landslides suffer from the lack of legal standards but also problems in describing magnitudes and probabilities. The hazard maps are generated within the ministry using their own experts. The hazard map has to be authorized by the minister of the Lebensministerium.

N.I. Larsen (Directorate for Civil Protection and Emergency Planning, Norway) Hazard and Risk Mapping – Concept in Norway

Several ministries are involved in risk mapping for which different national data bases are utilized. An annual report on national risk is continuously developed; communities have to use the potential risk maps particularly for planning purposes, permissions for housing, etc. Communities also have to participate in the risk mapping. The important

role of municipalities is a Norwegian tradition. At the same time municipalities have usually few resources for complex risk analysis, so that simple and inexpensive tools are required for them.

Fabio Sabetta (Seismic and Volcanic Risk Office, Italian Civil Protection Department)

Seismic Risk Assessment and Reduction

Key risk in Italy is the earthquake which can occur in most parts of the country with reasonably likelihood. Losses by earthquakes are significantly higher than those caused by landslides in terms of financial losses but also in terms of mortality. In the past 35 years about 4 billion Euros per year losses are caused by earthquakes, against which no general insurance is available. The probabilistic assessment of hazard and risk but also micro zoning and quick scenario development are stressed in the presentation. The high relevance of technical training is emphasized as this is required to support the application of building codes, for damage surveys after earthquakes including the identification of safe buildings and the quick response after disasters.

MATRIX Concepts

Kevin Fleming (GFZ Postdam)

Issues considered by the New Multi-Hazard and Multi-Risk Assessment Methods for Europe

Kevin Fleming presented key issues of the FP7 MATRIX project. Multi-single type hazard and risk assessment considers any number of hazards and risks individually; spatial and temporal relationships between them are neglected. Contrary to that – and this is the topic of MATRIX – multi-type hazard and risk assessment considers different types of hazards and risks but their spatial and temporal relationships are explicitly considered. Main issues in multi-type assessment are the interaction and amplification of risks, dynamic vulnerability that changes through time, and the application of multi-risk assessment in different contexts.

Arnauld Mignan (ETH-Zurich)

MATRIX City – a Common IT System for Multi-Hazard and Multi-Risk Assessment

The MATRIX City Tool is generic in the sense that all types of hazards can be included; it aims at probabilistic outcomes although, as these are based on sets of deterministic scenarios, it also is useful for scenario development. The tool will be fully developed by summer 2013 and be available for 'exercises' with stakeholders at

the final MATRIX workshop in 2013. High interest has been shown by the Italian civil protection and the Swedish representation but also from the ISDR representative.

Bijan Khazai (Karlsruhe Institute for Technology)

Risk MATRIX Analysis - An Exercise in Stakeholder-Driven Decision Analysis

The decision making tool was presented as an exercise to determine rankings within the decision processes in the risk matrix methodology. It is available for use in its current form, although it still relies on a commercial piece of software, which will be replaced by open source tools in the near future. High interest in the tool was shown by several participants. As in case of the MATRIX City Tool an exercise with stakeholders should be developed for the final MATRIX meeting.

Discussion on the Development of a White Paper

The participants agreed that a paper to be published in a scientific journal (e.g. NATHAZ) should be developed in the forthcoming months. It should contain definitions of multi-hazard and multi-risk, reflecting the definition on the stakeholder meeting. It should contain the major discussion items raised in the presentations from participants. It should also contain overviews on the two presented tools.

Summary

The representatives communicated their views on the multi-risk issue. Most interestingly, the value of hazard assessment and hazard maps appears to be higher than the value of risk maps. Hazard maps can be used for planning and prevention, whereas risk maps are also valuable for raising awareness.

There are different forms of including risk in the mapping process such as the French approach of overlaying exposure and hazard, or the Norwegian of defining potential risk maps. General standards for risk assessment are lacking. Cascading phenomena are of high interest, but easier to address with scenarios as compared to probabilistic methods. Uncertainties particularly in scenarios are not addressed in a systematic way.

High interest on both MATRIX products, that were presented (MATRIX City and the Decision Support Tool) encouraged the MATRIX representatives (a) to further develop these tool, including the suggestions discussed during the meeting; (b) seek direct interaction with some representatives; (c) planning for full-scale demonstration at the final MATRIX workshop in 2013.

4th of September 2012
Friedemann Wenzel
Kevin Fleming
Roger Mrzyglocki

Annex:

Participant	Organisation	Address
Mr. PICHLER Andreas	Federal Ministry of Agriculture, Forestry, Environment and Water Management, Austrian Service for Torrent and Avalanche Control	Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft Stubenring 1 1010 Wien Austria
Ms. BILJAKOVIC Katica	National Protection and Rescue Directorate	Institute of Physics Bijenicka cesta 46 p.o.b. 304 Hr-10 001 Zagreb Croatia
Mr. GERARD François	Ministère de l'Écologie, de l'Énergie, du Développement durable et de la Mer	Association Française de Prévention des Catastrophes Naturelles (AFPCN) c/o ENGREF, 19 avenue du Maine
Ms. LENZ Susanne	Federal Office of Civil Protection and Disaster Assistance (BBK)	Federal Office of Civil Protection and Disaster Assistance PO Box 1867 53008 Bonn Germany
Mr. SABETTA Fabio	Civil Protection Department, Department - Seismic and Volcanic Risk	Ufficio Valutazione del Rischio Sismico Dipartimento della Protezione Civile Via Vitorchiano 4 00189 ROMA Italy
Mr. LARSEN Nils Ivar	Directorate for Civil Protection and Emergency Planning	Directorate for Civil Protection and Emergency Planning Rambergveien 9 3115 Tønsberg Norway
Mr. NYBER Lars	Center for Climate and Safety	Centre for Climate and Safety Karlstad University S-651 88 Karlstad Sweden
Ms. DANNENMANN - DI PALMA Stefanie	United Nations Office for Disaster Reduction Europe	United Nations Office for Disaster Reduction (UNISDR) Europe UN House, 14 Rue Montoyer 1000, Brussels, Belgium

Mr. WENZEL Friedemann	Karlsruhe Institute of Technology (KIT)	Karlsruhe Institute of Technology (KIT) Geophysical Institute Hertzstr. 16 76187 Karlsruhe Germany
Mr. KHAZAI Bijan	Karlsruhe Institute of Technology (KIT)	Karlsruhe Institute of Technology Center for Disaster Management and Risk Reduction (CEDIM) Hertzstr. 16 76187 Karlsruhe Germany
Mr. FLEMING Kevin	German Research Centre for Geosciences (GFZ)	Section 2.1 Earthquake Risk and Early Warning Helmholtz Centre Potsdam GFZ German Research Centre for Geosciences D-14473 Potsdam, Germany
Mr. MIGNAN Arnaud	ETH Zurich, Swiss Seismological Service (SED)	ETH Zürich Schweiz. Erdbebendienst (SED) NO H 66 Sonneggstrasse 5 8092 Zuerich
Ms. KOMENDANTOVA Nadejda	International Institute for Applied Systems Analysis (IIASA) Risk, Policy and Vulnerability Program	International Institute for Applied Systems Analysis (IIASA) Schlossplatz 1 A-2361 Laxenburg, Austria
Mr. MRZYGLOCKI, Roger	German Committee for Disaster Reduction (DKKV)	Friedrich-Ebert-Allee 38 53113 Bonn Germany
Mr. ZENTEL, Karl- Otto	German Committee for Disaster Reduction (DKKV)	Friedrich-Ebert-Allee 38 53113 Bonn Germany
Mr. NADIM, Farrokh	International Centre for Geohazards (ICG)	International Centre for Geohazards (ICG) c/o NGI, PO Box 3930 Ullevål Stadion, NO-0806 Oslo, Norway
Mr. DIENEL, Hans- Liudger	Center for Technology and Society Berlin University of Technology	Center for Technology and Society Berlin University of Technology Hardenbergstrasse 16-18, HBS 1 D-10623 Berlin

Appendix 3 – Feedback sheet

MATRIX Stakeholder Workshop, 5/6 July 2012, Bonn Feedback sheet

1. Quality of presentations and discussions. **Note: Please only value the presentations from the MATRIX-team**

- Did the presentations and discussions convey new findings and insights to you? (yes/no)
 - If yes. Please list max. 3 major points:
 - Please list here...
 - Please list here...
 - Please list here...
- Do you consider contents, results and discussions of the workshop as useful for the work in your organization? (yes/no)
 - If yes. Please specify added values.
 - Please list here...
 - Please list here...
 - Please list here...

2. Interaction (please value, while 1=bad and 5=very good):

- Do you have the impression that the discussions will have an impact on the further research activities of MATRIX? Enter a value = X

3. Organisational (please value, while 1=bad and 5=very good):

- Information: Was the information in preparation of the workshop helpful (e.g. Workshop Concept Note) in order to understand the workshops objectives and your role in this context? Enter a value = X
- Logistics: Enter a value = X
- Time reserved for discussions: Enter a value = X
- Moderation: Enter a value = X
- Venue: Enter a value = X

4. Outlook

- Did the workshop change your view on multi-risk issues? (yes/no)
 - If yes, please specify:
- Are you interested to attend another MATRIX-stakeholder meeting in the future (1 to 1 ½ years) when either new results and/or better examples are available? (yes/no)

5. Comments: Please feel free to enter any other comments

Appendix 4 – Synthesis of Stakeholder Questionnaires

Synthesis of Stakeholder Questionnaires Roger Mrzyglocki German Committee for Disaster Reduction (DKKV)

1. Introduction

To be useful in disaster management, multi-risk tools and methods need to be inline with the requirements and expectations of the civil protection community. The MATRIX project's participatory and interactive character involves European and international civil protection stakeholders from the very beginning. In preparation for the MATRIX Stakeholder Workshop held in Bonn on 5/6 July 2012, a questionnaire was developed and submitted to the participating stakeholders. The general aim was to improve the knowledge of the MATRIX research community of the value of multi-hazard and multi-risk approaches under real-world conditions. The questionnaire was submitted to National Platforms for DRR. These are mainly represented by the national civil protection authorities or scientific organisations acting on behalf of the National Platforms. This group is called in this context the Cooperation Partners (CPs).

Representatives of the following European National Platforms participated in this process: Austria, Czech Republic, France, Germany, Italy, Norway, Poland, and Sweden.

The reasons for of submitting the questionnaire to the CPs include the following:

1. To fully comprehend their understanding of the term “multi-risk”.
2. To obtain an overview of the state-of the art of hazard, risk and multi-risk assessment.
3. To receive feedback to identify the level of integration of hazard and risk assessments into decision making processes.
4. To assess the usefulness of multi-risk scenarios for disaster management strategies.
5. To receive feedback on the requirements for multi-risk methods and tools.

2. Definition

Almost all participants agreed that multi-risk is: “a combination of potential events, for example, a simultaneous appearance of two or more hazardous events at a location or a sequence of events on a certain timeline. These events may lead to domino effects, time dependent vulnerability or potentiating of risk.”

However, it became apparent during the subsequent workshop that there was not a common understanding of, nor a smooth transition between, the terms *hazard* and *risk* among the stakeholders. This fact indicates that a common terminology does not exist and disaster management terms are used differently among different European countries. The UN-ISDR² has developed basic definitions on disaster risk reduction terminology, which may be helpful in homogenizing the understanding of disaster management terms. The MATRIX project will also provide definitions and a glossary within the context of multi-hazard and multi-risk as well, contributing to a common understanding of terms³.

3. Availability of comprehensive hazard assessment

In summary (Figure 1), significant progress has been achieved in terms of flood hazard assessment, probably and partly as a result of the implementation of the EU Flood Directive⁴ among EU Member States. Considerable progress also seems to have been achieved for landslides. However, problems appear to be associated with regards to:

- availability of official assessments,
- reliable methods,
- availability of data, and
- geographical coverage.

Due to the fact that only a few responding countries are threatened by volcanic eruptions or tsunamis, the amount of available assessment information for these hazards is very low.

² <http://www.unisdr.org/>

³ Deliverable D3.2 “Dictionary of the terminology adopted”

⁴ http://ec.europa.eu/environment/water/flood_risk/index.htm

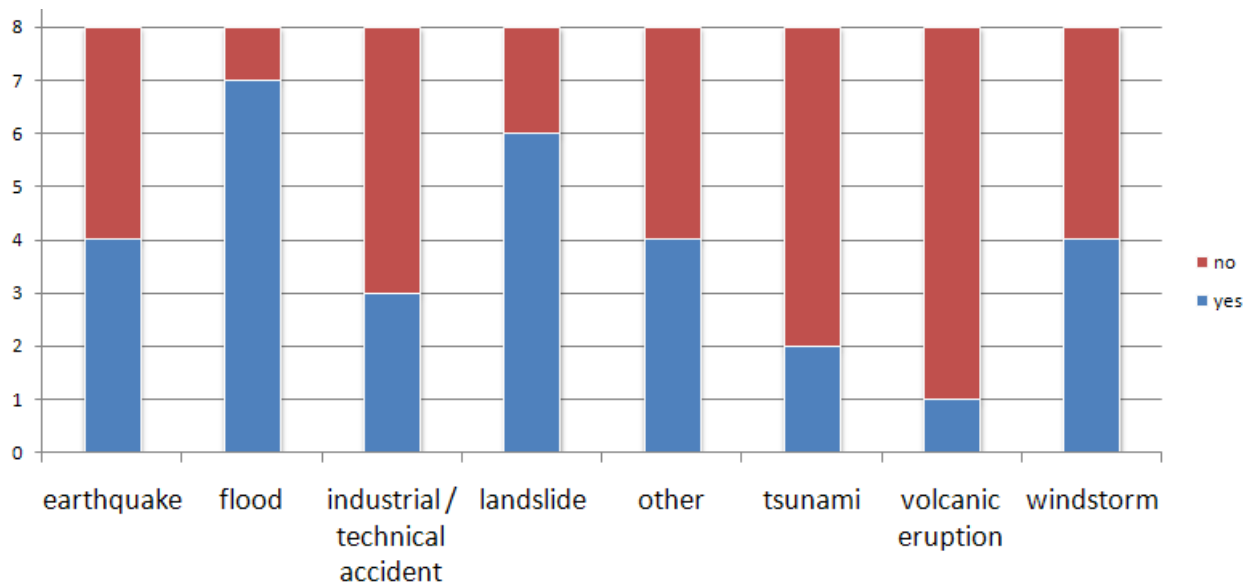


Figure 1: Availability to the responding countries of a comprehensive hazard assessment per hazard (n=8 responses).

4. Availability of comprehensive risk assessment

For risk assessment (Figure 2), a similar distribution can be shown on a lower level. Generally, there has been less progress made in implementing comprehensive risk assessments compared to hazard assessments. Nonetheless, progress has been achieved in terms of floods, followed by landslides, windstorms, earthquakes, tsunami and volcanic eruption. It should be stressed again that the terms hazard and risk are used differently by the stakeholders. Therefore, the comparability of the Figures 1 and 2 may be limited, although the questionnaire sections were subdivided into a hazard assessment and risk assessment section.

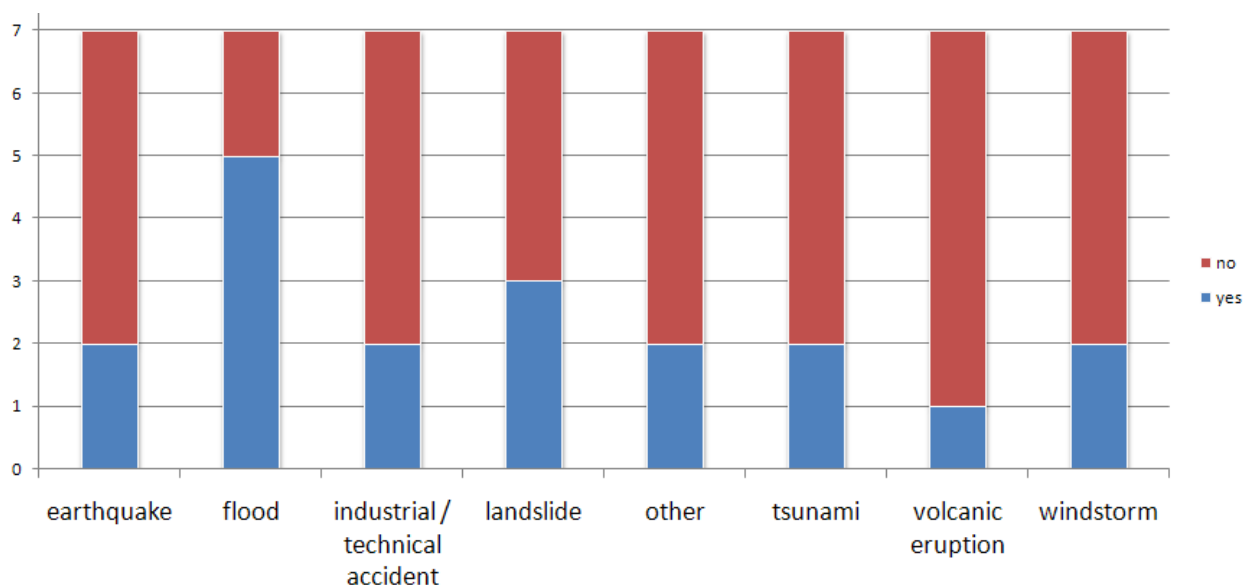


Figure 2: Availability to the responding countries of a comprehensive risk assessment per hazard (n=7 responses).

5. Types of hazard assessments

The types of hazard assessments available range from studies and surveys to standards, hazard maps and risk- and vulnerability analysis.

Hazard maps are predominantly used within the context of floods and earthquakes, while the implementation of Eurocode 8 (Design of structures for earthquake resistance) was also mentioned for earthquakes. For seismic hazards like tsunamis and volcanic eruptions, surveys and studies are more common approaches. For windstorms, a mixture of mapping, studies and risk & vulnerability analysis was detected. In terms of landslides, despite the general drawbacks discussed above, hazard maps, stability maps and inventories are available. Obviously, while there are different approaches for assessing hazards, this fact simultaneously reflects the different implementation and comprehensiveness levels of the presented approaches.

6. Types of risk assessments

Typically, risk assessments for floods include flood risk maps and flood risk management plans, as specified by the Flood Directive. In Italy, for example, there is a distinction between “no-real time” and “real time” risk assessments. These are specified by law and implemented by a joint platform incorporating data and models. They are available for floods and landslide for the whole Italian territory at different scales. The “**real time**” approach includes non-structural measures like early warning systems and civil protection planning, while the “**no-real time**” risk

assessment includes structural measures like dikes and non-structural activities like urban planning. Seismic Risk Maps are available in Italy with regards to the damage of the buildings (0-5) including information about unusable dwellings, fatalities and people rendered homeless.

The classical risk matrix approach, as introduced by the European Commission in collaboration with other Member States, is a methodology used by the German Federal Office of Civil Protection and Disaster Assistance (BBK) and other member states in order to provide a common methodology for risk assessments.

There are some approaches that may be regarded as preliminary risk assessments. For example, overlaying hazard and asset maps, but excluding vulnerability, is a common method used in France. This method is used within the context of Risk Prevention Plans for preliminary risk assessment purposes at the municipal level.

In some countries for tsunami and industrial / technical accidents, so-called risk and vulnerability analyses are conducted for the most hazardous industries (e.g., Norway and Sweden).

7. Results of Hazard Assessment used for decision support

All stakeholders state that they use results obtained from hazard assessments in their decision making processes. Different application areas were mentioned:

- Planning: regional/local protection measures, land use planning, urban planning, infrastructural programs, contingency planning.
- Prioritization and evaluation of protection measures.
- Safety of critical infrastructure.
- Seismic zoning, building code enforcement.
- Prevention efforts, e.g., this is the basis of French risk prevention plans, in particular public awareness.

With regard to the value of hazard assessments for decision-making purposes, the values given ranged from medium to high.

8. Results of Risk Assessment used for decision support

Similarly to the hazard assessment, the results of risk assessments are used by different stakeholders in various ways for decision-making purposes. The main areas of application are:

- Formulation of National building code,
- Scenarios and emergency planning and response,
- Allocation of funds for risk mitigation,

- Urban management,
- Prevention efforts.

9. Scientific methods

Probabilistic and scenario analyses are the most widespread methodologies used among the stakeholders. In particular, scenario analysis seems to be the state-of-the-art. On the other hand, the estimations of uncertainties are not commonly used due to a lack of adequate methodologies and reliable data. The stakeholder stated that they increasingly consider uncertainties in modeling. Socio-economic and engineering models may be at a promising development level and the increasing availability of data makes them more usable (see Figure 3).

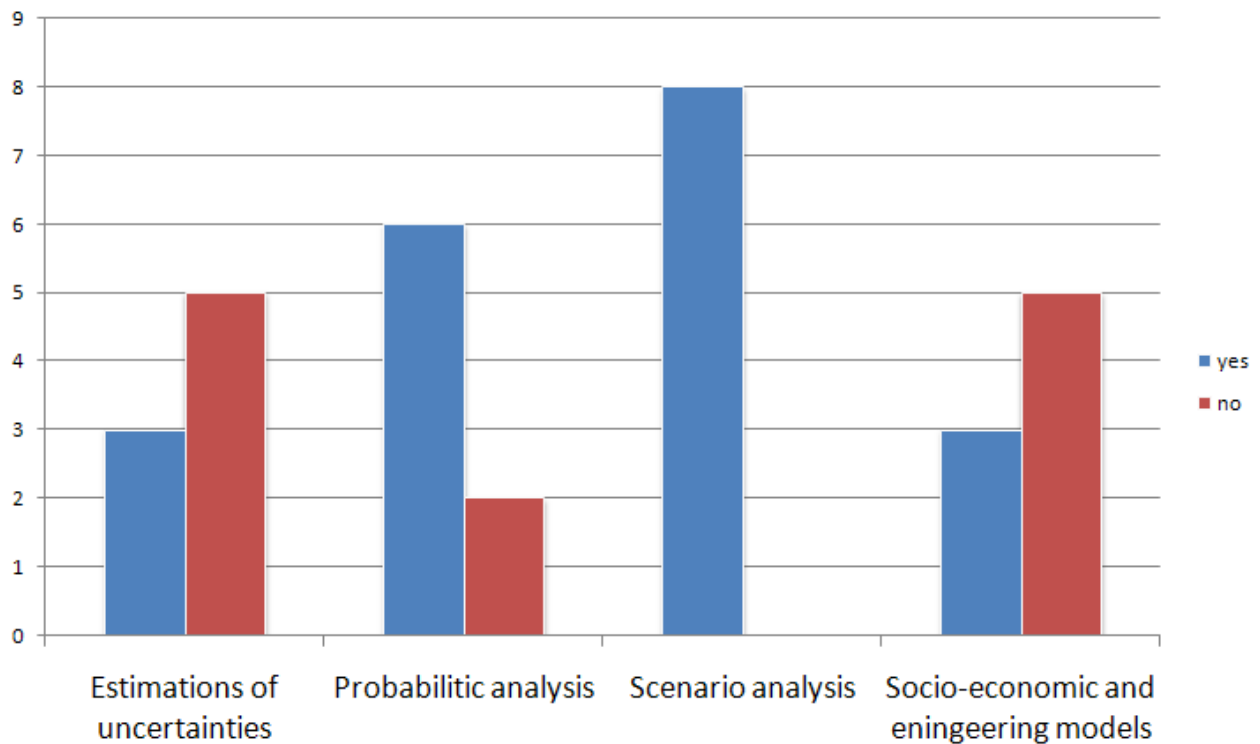


Figure 3: Methodologies that are applied by the responding cooperative partners.

10. Multi-risk

Beyond assessing the state of the art of single-hazard and single-risk assessments, one core aim of the survey was to assess the occurrence of multi-risk approaches. It was found that 50% of the responders were aware of methodologies and tools to assess multi-risk. Although there is some progress being made at the conceptual level, the general conclusion is that multi-risk analysis is barely or not at all integrated into decision making processes.

However, multi-risk approaches are applied within the following contexts:

- Superposition of existing single hazard risk prevention plans for all hazards.
- Combining flood and landslide hazards and flood risks with wind effects.
- Especially applied in the context for risk assessment of critical infrastructure.
- Combining meteorological and technological risks.

11. Integration of multi-risk into the own working environment

The majority of stakeholders would consider the application of complex multi-risk scenarios in disaster management (5 out of 8). The same applies to the use of MATRIX tools and methods after a testing phase. In summary, complex multi-risk scenarios were stated to be useful, but should be able to generate reliable and transparent information, be well documented, and be cost-free for the civil protection community.

12. Multi-hazard and Multi-risk requirements

The following issues were outlined in the responses:

- The availability of basic information and data (qualitative / quantitative), as well as a proper understanding of spatial and temporal probabilities and vulnerabilities, are the major basic preconditions.
- The reliable and transparent calculation of combined/joint probabilities is another important point.
- Comparability of hazards.
- Consequence analysis (including the vulnerability of people, property, infrastructure, goods) and risk calculation (including risk to life, goods, etc.).
- Transparency (e.g., simple guidelines), traceability, reliability, cost-free are major criteria for the application of multi-risk methods in civil protection. This, in particular, applies to the local/municipality levels, where the necessary skills, personal and financial resources are limited.

13. Advantages of multi-risk compared to single-risk

The major advantages of multi-risk assessments include the potential for intensified cooperation between stakeholders and administrations, as well as better planning and cost effectiveness during decision-making processes. Furthermore, multi-risk would provide a systematic approach that enables the comparability of different risk types and the opportunity to handle complex risks. On the other hand, it was recognized that multi-risk may be a complementary approach which is not comparable with single-risk assessment. For example, the response from Sweden commented that the risk system (single, multiple, multiple parallel, etc.) needed to be

first defined. The point raised was that if the relevant single-type hazards/risks are related/dependent upon each other, a multi-type scheme is essential. Single-type methods would be inadequate owing to the interdependency of the phenomena which will need to be addressed, even if it is via a simplified scheme.

14. Multi-risk implementation barriers

Major financial and political hindrances may appear from the point of view of the stakeholders, since multi-risk requires inter-administrative efforts. At the same time, it can be challenging to handle joint probabilities of different hazards and complicated methodologies, leading to technical and operational barriers.

Appendix 5 – MATRIX Stakeholder Workshop participation & Received Questionnaires

Registrations to the MATRIX Workshop and status of filled-in MATRIX Questionnaires

Status as of 5.06.2012

Country	Workshop participation / Questionnaire submitted	Organisation	Participant	Position
Austria	YES / YES	Federal Ministry of Agriculture, Forestry, Environment and Water Management	Mr PICHLER Andreas	Head of Department - National Crisis and Disaster Protection Management
Bulgaria	NO/NO	Ministry of Interior - DG Fire Safety and Protection of the Population	Ms STOYANOVA Gloria	Expert - International Cooperation Unit
Czech Republic	NO / YES	Czech National Committee for Natural Disaster Reduction	Ms Caletkova Jana	Head of Department of Water, Energy, Food
Croatia	YES / NO	National Protection and Rescue Directorate	Ms BILJAKOVIC Katica	Scientific advisor at Institute of Physics, Zagreb; Representative of the Ministry of Science in CCPDR (Committee of Croatian Platform for Disaster Reduction)
France	YES / YES	Ministère de l'Écologie, de l'Énergie, du Développement durable et de la Mer	Mr GERARD François	Former Chef du bureau information préventive, coordination et prospective MEEDDAT / DGPR / SRNH / bipcp

Germany (BBK)	YES / YES	German Committee for Disaster Reduction and Federal Office of Civil Protection and Disaster Assistance (BBK)	Ms LENZ Susanne	Expert risk assessment
Hungary	NO / NO	National Directorate General for Disaster Management - Ministry of Interior	Ms RAJICIC Ágnes	Senior Desk Officer - Department for International Relations and Legal Affairs
Italy	YES / YES	Civil Protection Department	Mr SABETTA Fabio	Department - Seismic and Volcanic Risk
Norway	YES / YES	Directorate for Civil Protection and Emergency Planning	Mr. LARSEN Nils	Senior adviser - Research and analysis
Poland	NO / YES	Institute of Meteorology and Water Management Branch Office in Cracow (IMGW)	Mr WALCZYKIEWICZ Tomasz	Division of Water Management
Spain	NO / NO	Dirección General de Protección Civil y Emergencias	Mr LAHORE Juan Pedro	Director
Sweden	NO / NO	Department of Fire Safety Engineering and systems	Mr PETERSEN Kurt	Prof.
Sweden	NO / NO	Center for Natural Disaster Science	Mr HALLDIN Sven	Prof.
Sweden	YES / YES	Center for Climate and	Mr NYBER Lars	Coordinator

		Safety		
UK	NO / NO		Mr BARNES Steven	
Iceland	NO / NO			
CoE	NO / NA	European and Mediterranean Major Hazards Agreement (EUR-OPA) Council of Europe	Mr FERNÁNDEZ-GALIANO Eladio	Executive Secretary
EC (DE LANNNOY Thomas)	NO / NA	European Commission - DG - ECHO Humanitarian Aid and Civil Protection - Unit ECHO C3 Civil Protection - Disaster Response	Mr DE-LANNNOY Thomas	
ISDR Europa	YES / NA	United Nations International Strategy for Disaster Reduction, UNISDR	Ms DANNENMANN Stefanie	Programme Officer