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Management of Natural and Technological Hazards

in Central and Eastern European Candidate Countries (PECO)

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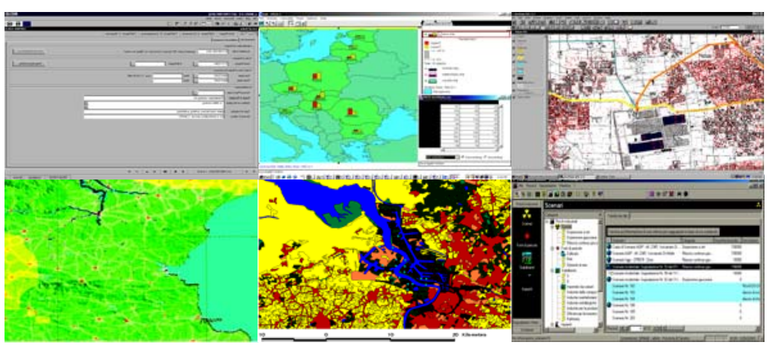

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**Fifth Framework Programme of
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Project Report

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This report was prepared jointly by the Major Accident Hazards Bureau (MAHB) and the office of the Natural and Environmental Disaster Information Exchange System (NEDIES) which are part of the Technological and Economic Risk Management Unit of the Institute for the Protection and Security of the Citizen (IPSC) of DG-Joint Research Centre (JRC) of the European Commission.

The Institute for the Protection and Security of the Citizen

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The Major Accident Hazards Bureau (MAHB)

The Major Accident Hazards Bureau (MAHB) is a special unit within IPSC's Technological and Economic Risk Management Unit, dedicated to scientific and technical support for the actions of the European Commission in the area of the control of Major Industrial Hazards. The overall mission of the Bureau is to assist other services of the Commission, and in particular DG-Environment in the successful implementation of European Union policy on the control of major hazards and the prevention and mitigation of major accidents. To fulfil this mission, MAHB carries out scientific and technical activities related to the day to day implementation of relevant Community legislation. http://mahbsrv.jrc.it.

The Natural and Environmental Disaster Information Exchange System (NEDIES)

NEDIES is a European Commission project developed in the framework of the DG- Joint Research Centre Institutional Programme aimed to support EU policies, mainly those of the Civil Protection and Environmental Emergencies Unit of DG- Environment, in the area of prevention, mitigation and management of natural risks and accidents. The main objective of the NEDIES project is to support the Commission Services of the European Community, Member State Authorities and European Organisations and the citizens in their efforts to prevent and prepare for natural and technological non-Seveso disasters and to manage their consequences. For more information, please visit the website at http://nedies.jrc.it.

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Abstract

The focus of the JRC Enlargement project, "Management of Natural and Technological Hazards", is the management and mitigation of risk from technological and natural hazards. The project provides for the extension of activities of the JRC in these areas to include the Candidate Countries. The extension of these activities has been pursued through a sequence of actions: workshops, analyses of existing situations, prioritising of interventions, data collection; transfer of EU software tools, training, joint projects and benchmark exercises. This report describes the outcome and achievements of the project and offers relevant recommendations for future work in this area.

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Introduction

The accession criteria (the so-called Copenhagen criteria), established with a view to the enlargement of the European Community, state that membership in the Community requires the ability to fulfil certain membership obligations, i.e., to comply with the European Directives and, in general, to adopt, implement and enforce the *acquis communautaire*. The Commission's 2001 Enlargement Strategy Paper underlined the requirement that Candidate Countries have the capacity to ensure a smooth functioning of the internal market, sustainable living conditions in the European Union, and the overall protection of the European Union.

The achievement of these objectives requires, among other things, the application of environmental and health and safety standards, and the strengthening of administrative, monitoring and enforcement capacity, in particular in the field of chemical and process industry, waste management, water, air and nature protection.

The JRC Enlargement project, "Management of Natural and Technological Hazards", addresses the management and mitigation of risk from technological and natural hazards.

The project covers the areas of activity conducted by the Major Accident Hazards Bureau (MAHB) and the Natural and Environmental Disaster Information Exchange System (NEDIES) within the JRC Framework Programme 5. MAHB provides the scientific and technical support to the General Directorate for the Environment (DG ENV) for the formulation, implementation and monitoring of Community policy on the control of major hazards and the prevention and mitigation of major accidents, chiefly the Seveso II Directive. It plays a central role in the follow-up actions, which result after the occurrence of any major accident, including the formulation of amendments to the relevant legislation. NEDIES is a European repository of lessons learnt from natural disasters and technological accidents not falling under the Seveso Directive. Scientific analysis of information stored in the NEDIES system is geared to assist Civil Protection Authorities.

The project, whose main outcome and achievements are described in the present report, provides for the extension of MAHB and NEDIES to the Candidate Countries. The extension of these activities has been pursued through a sequence of actions: workshops and mutual visits; analysis of the existing situation in each country; prioritising intervention areas; data collection; transfer of EU software tools and databases and relevant training; and joint projects and benchmark exercises.

The project was started halfway through Framework Programme 5 and, despite the short time span, was able to achieve substantial results and an effective integration/collaboration with PECO countries. The positive results that were obtained and the importance of the subject matter have led to the approval of the continuation of the Project in Framework Programme 6.

Alfredo C. Lucia

Executive Summary

Following the association of ten Central and Eastern European Countries (PECO)[1] to the framework programme in 1999, the JRC launched a special initiative dedicated to co-operation with these countries. Project PA No. 26, "Management of Natural and Technological Hazards", is one of 18 priority projects contained within the "JRC Enlargement Programme" which is aimed at supporting and addressing the needs of the candidate accession countries in their pre-accession process. The project was initially intended to create central information systems to support management of risk and emergency situations due to natural and technological hazards and to the existence of heavily polluted land sites. This paper describes the project organisation, structure, outcome and achievements and offers relevant recommendations for future work in this area.

PROJECT BACKGROUND AND PURPOSE

Within the European Union the development of tools and methodologies for assessing risk and making risk-based decisions has become a priority in the management of a variety of natural and technological hazards. On an ever-increasing basis terms such as risk criteria, risk analysis, risk communication and risk mapping are incorporated into Community proposals and strategy papers related to civil and environmental protection. As a result, a number of collaborations among Member States have been launched, many of them Community-funded, so as to learn from each other's experiences in this area, share technical information and develop solutions to common problems.

The project on management of natural and technological hazards in PECO countries was conceived as a way of augmenting the resources and expertise of PECO countries in the management of natural and technological hazards in preparation for accession and of fostering integration and co-operation between Member States and PECO countries in that field. PECO countries have to face challenges and problems of ever increasing dimension and complexity from a wide range of disasters and emergencies, arising both from natural and technological hazards. Furthermore, quite a serious threat to the safety and health of the citizen is constituted by the legacy of land polluted by industrial spoil, military activities and improper handling of hazardous wastes prior to regime changes in 1989-90: actions for land recovery or for reduction of risk have to be undertaken. In relation to this challenge, it was considered that development of risk analysis and management strategies for natural and technological hazards, and risk assessment and recovery strategies for polluted sites, constitute a particularly urgent need. Furthermore, risk assessment and management of these hazards share risk-related methodological approaches, information management tools and data sources, which allows them to be addressed in a synergistic and co-ordinated way.

Moreover, it was assumed that all the countries faced at least one common risk priority which would motivate their participation in the project: risk management of hazardous installations. Council Directive 96/82/EC (the Seveso II Directive) is the European law targeting prevention of major-accident hazards involving dangerous

[1] Pays de l'Europe centrale et occidentale (PECO): Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia

substances and is an explicit part of the *acquis communautaire*. Implementation of the Seveso II Directive depends largely on the risk assumptions relative to the presence of dangerous substances at particular facilities. The project would aid the JRC in targeting expert assistance, in the form of technical exchange, and training and collaborative projects in this area, in order to help countries build appropriate capacity for the Directive's implementation.

The project was proposed by the Technological and Economic Risk Management (TERM) Unit of the Institute for the Protection and Security of the Citizen (IPSC) which has long experience and a wide range of expertise in the field of risk management. Centres of relevant expertise within the Unit include the Major Accident Hazards Bureau (providing scientific and technical support to Seveso II Directive implementation), the Natural Risks Sectors (operating the Natural and Environmental Disaster Information Exchange System (NEDIES) project), and the sectors for Integration of Information for Risk and Emergency Management, and for Decision Analysis for Risk and Emergencies.

PARTICIPATION OF PECO COUNTRIES

The JRC was successful in obtaining broad involvement in the project from every PECO country. Early in the project each country nominated a focal point (country co-ordinator), through whom official communication about project activities, and related requests and reports were disseminated. The focal point was either from the national environmental or civil protection authority. However, in all countries, a number of departments and competent authorities were involved in the project, including both environmental and civil protection authorities, but also occupational safety, inspection and technical services, and external experts from either research institutes or a consulting company. Moreover, local regional and national authorities often participated in training activities.

It is important to note at this point that the level of participation in this project exceeded the JRC's expectations. Inevitably, because of the multi-disciplinary nature of the project, certain parts of it required the contribution of information that stemmed from specialised knowledge regarding specific hazards. Therefore, the commitment required for this project was not small, especially for the country focal point who was obliged to exercise good skills in co-ordinating with his or her colleagues. The high quality information provided throughout the project was not only evidence of their success, but of their strong commitment to the project.

The JRC appreciates with great sincerity the co-operation, and the courteous and thorough manner in which each country involved itself in activities or in responding to information requests.

PROJECT OBJECTIVES

Towards the beginning of the project the JRC hosted a workshop in Ispra with the ten PECO countries to obtain a general overview of priorities related to hazards management and in particular, where risk assessment support was especially needed. It was assumed that all the countries faced at least one common risk priority which would motivate their participation in the project: risk management of hazardous installations. Implementation of the Seveso II Directive, the European law targeting prevention of major-accident hazards involving dangerous substances, depends largely on the risk assumptions relative to the presence of dangerous substances at particular facilities.

From the information presented at the workshop, the JRC and the Candidate Countries refined the direction and defined priority hazards and activities of the project. The workshop participants identified the following hazards as having the highest priority (in no particular order):

Technological Hazards

- hazardous installations
- contaminated lands
- pipelines
- oil shale mining
- transboundary pollution
- transport of dangerous goods

Natural Hazards

- floods
- forest fires
- landslides
- earthquakes

Among these, as expected, hazardous installations were named as the highest priority because they fall under the Seveso II Directive, which must be transposed and implemented prior to accession of each country as part of the *acquis communautaire.* In fact, it became evident at the seminar that the Seveso II Directive was of a common high importance to each country. Therefore, the JRC could expect some involvement in the project from PECO governments if the project were clearly linked to Seveso II Directive implementation.

Moreover, it was concluded that PECO governments would be more likely to commit to the project if its objectives were clearly aligned with other existing hazard priorities. Therefore, the project should aim to establish information management tools that would reflect hazard identification and analysis priorities of the region, or common to a number of countries within the region. It was also recognised that the project could not, at least at the beginning, demand significant resources from each country.

It also became clear in the workshop that, among the PECO countries, there was great variation concerning data and data availability, tools and expertise applied to risk assessment and risk management of natural and technological hazards. Efforts to apply or develop new information management and risk-based screening tools would need to take this into account. As a result, added emphasis would have to be placed on understanding the systems, structures and resources in place within each country for addressing these hazards.

PROJECT WORKPLAN

Subsequently, the JRC developed a detailed work plan to reflect the needs and priorities identified in the seminar. The decision was made to focus the work plan on three topic areas, which were ordered by rank of importance to the project as follows: hazardous installations (Seveso II), priority natural hazards (as identified in the workshop), and other priority technological hazards (as identified in the workshop). As a result, a majority of project resources was directed to support information and risk management activities related to Seveso II implementation. This decision was based on the clear precedence that all the PECO countries assigned to Seveso II implementation over the other priority hazards selected in the workshop.

It was further recognised that, without a legal act like the Seveso II Directive, interest in the project would be less consistent for natural hazards or for the other priority technological hazards of the project. In particular, the lack of a standard European approach, such as a Directive, for managing these hazards made the starting point for such efforts much less clear. Therefore, it was determined that further study of the direction of each country's programmes and priorities would be required to develop a sense of where common approaches to management of risks would be most beneficial in the near future. Moreover, identifying opportunities for providing future information and risk management support to these natural and technological hazards was understood to be a main objective of the project.

As a consequence, project objectives related to natural hazards and other technological hazards were more modest in scope, aiming primarily to engage PECO countries in some of the JRC's information exchange activities of NEDIES and to learn about their programmes and expertise through these and other interactions within the project. Slightly more resources in the project were devoted to natural hazards because of the greater interest expressed by the representatives at the seminar in these hazards. In part, this choice was also based on practicality, that is, many of the competent authorities managing Seveso implementation within the PECO countries also managed natural risks. Therefore, it was possible for some countries, who were active in the project on the basis of their Seveso implementation needs, to also contribute to the natural hazards side of the project without a significant addition of resources.

Finally, the project had envisioned providing additional support on information and risk management systems for integrated risk management, that is, systems to support decisions that take all the priority natural and technological risks present in a region. It was thought that the project should solicit more information and discussion with PECO countries on this topic in order to focus this support appropriately.

Having established this overall framework, the JRC developed the workplan described as follows:

1. **Collection and Analysis of Existing Data and Information.** Information collection efforts would primarily be focused on obtaining comprehensive information about the availability and quality of data that existed in PECO countries to support implementation of the Seveso II Directive, particularly data on the quantities and types of dangerous substances present in hazardous installations. In the natural hazards area, an intensive effort would be launched to encourage participation of PECO countries in NEDIES.

2. **Collection of Data and Information on Seveso Implementation and Training Needs.** This objective was designed to collect further data and information about the needs and capacity of each country related to risk management and to evaluate data in relation to natural and technological risks. Seveso was identified as the principal target under this objective. However, the JRC also sought to gain a pre-defined minimum set of information from the PECO countries in relation to natural and other technological hazards.

3. **Training and Research in Risk Assessment Applications.** It became evident early in discussions with PECO countries that building capacity in risk assessment for hazards management was considered essential to the success of hazard management strategies, and particularly implementation of the Seveso II Directive. As a result, the JRC included training and research in risk assessment applications in the final work plan.

4. **Development and Dissemination of Information Management and Risk-Based Screening Tools.** Under this objective, the JRC sought to develop information management and risk-based screening tools, or to adapt its existing tools, through collaborations with PECO countries. This part of the project would build on the information gathering efforts to help define needs and interests in this regard within the different countries, and also to identify areas and organisation where similar work might be taking place. This objective would also explore whether management of various natural and technological risks could be enhanced through integrated management of these risks at the local or regional level.

ACTIVITIES AND ACCOMPLISHMENTS

The JRC implemented a number of activities in order to fulfil the objectives of the project. The activities can be divided into four categories: technical assistance and exchange; providing information and tools for risk management; collaborations on research and development of new tools; and information gathering. In practice, these activities were not mutually exclusive. The JRC was generally able to advance more than one objective through the course of one dedicated activity, e.g., gathering information on Seveso implementation through training, building expertise in PECO through collaborative projects and technical exchanges, etc. The accomplishments thus reflect an integrated approach to achieving project objectives through multiple activities.

The central activities of the project were as follows:

Seminar on Management of Natural and Technological Hazards (March 2001). The goal of this seminar was to establish appropriate contacts for the project within the PECO countries and to establish project priorities and an operating framework.

Dissemination of the MARS/SPIRS software tool to PECO Countries. The MARS/SPIRS software was distributed to all PECO countries in fulfilment of an agreed action item from the March 2001 seminar. The Major Accident Reporting System (MARS) is a software tool for managing information on major accidents reported under Seveso II. It is the tool by which all Member States report industrial accidents to the Commission, in accordance with the Directive. The MARS accident database is managed by the JRC.

The SPIRS software tool is designed to establish an information management system for collecting, organising and analysing the data of major hazardous industrial establishments that fall under the provisions of the Seveso II Directive. The SPIRS software also allows these data to be associated with spatial information and the JRC has purchased a number of licenses that allows it to offer a limited number of maps with the software. Alternatively, the system also allows each user to add his or her own maps. The software also contains a risk-ranking tool that allows a simple prioritisation of installations according to risk characteristics.

Training on MARS/SPIRS software. The JRC held training on-site in each of nine PECO countries from September 2001 through March 2002 (excluding Romania). This training was aimed to help each country understand the purpose and basic functions of the software well enough to use it for its own purposes. Participants were given background on the development of MARS/SPIRS and an explanation of the functions of the software with demonstrations. A portion of the programme was also dedicated to risk assessment, including an overview of basic principles and discussion of the types of approaches under consideration in the country for the Seveso II Directive. The meeting participants were also given an overview of Seveso II implementation support available through the Commission via the JRC. As part of the meeting, each country was also asked to make a presentation on preparations for Seveso implementation in the country. During these meetings, time was also allocated to learning about risk assessment needs related to natural and other technological hazards.

Collection of existing data and information relative to hazardous installations and Seveso II implementation in PECO countries. As envisioned in the project proposal the JRC also sought information that would allow it to assess the existing capabilities and needs of each PECO country in relation to information and risk management. It also sought comprehensive information on each country's progress in transposing and implementing the Directive. Together these two areas of knowledge would form a basis for targeting future collaboration and exchanges relevant to the management of industrial risks. This information was gathered under the following activities:

- Survey of data collection and management for Seveso implementation in PECO countries. This survey, distributed to and completed by all the PECO countries, allowed the JRC to acquire precise information about the availability and character of hazardous installations data collected in each country. The JRC also included questions relating to the accessibility of data for use in the competent authorities and whether it was available in electronic form.
- Delivery of hazardous installations data to the JRC by several countries. Five countries provided the JRC with official or preliminary databases of hazardous installations in their country that were, or were expected to be, covered under the Seveso II Directive. The Czech Republic, Estonia, Latvia, Poland and Romania, have all provided the JRC with a complete set of hazardous installations data (preliminary or official estimates) for input in the SPIRS database, which in total account for 680 out of over 1.000 Seveso installations in PECO countries.

- Systematic collection of information on Seveso II implementation. The JRC systematically collected implementation information that would allow it to create a profile of each country's Seveso implementation strategy and schedule. Using a template of questions about key implementation activities under Seveso, the JRC collected information through documentation supplied by different countries, through presentations at project seminars and training workshops, as well as dedicated interviews and correspondence with project focal points in each country.

Collaboration on Applied Research and Tools for Risk Assessment of Hazardous Installations. The JRC launched projects with both Poland and Slovenia in regard to risk assessment for hazardous installations.

- Poland. During the SPIRS/MARS training meeting in Warsaw, Poland presented a software tool it had developed for applying the IAEA risk assessment methodology. This presentation led the JRC to contract with Poland in 2002 to integrate the software into the SPIRS software tool. It is expected that the product will be ready to be tested sometime early to mid-2003.
- Slovenia. Slovenia also expressed interest in working with the JRC on a risk assessment pilot project in Slovenia in order to gain experience in applied risk assessment and to develop a recommended approach or approaches to its industry. The resulting project was designed as a benchmarking project, in which different risk assessment tools are applied to a number of different hazardous installations and the results are compared. The project is expected to be completed in early 2003.

Technical exchange on natural hazards management with Member States. Several countries participated in the workshops on natural hazards issues sponsored under the JRC's NEDIES (Natural and Environmental Disaster Information Exchange System) project. The aim of the NEDIES expert meetings and workshops is to provide an interdisciplinary platform for dialogue in order to facilitate the exchange of information between all the actors involved in the management of disasters and accidents. With a view to enlargement, they also provide an alternative networking mechanism between EU Member States and Candidate Countries to exchange experiences and identify synergies. A main output of these events is the publication of official European Commission EUR reports (lessons learnt, guidelines or recommendations), which are disseminated to DG-Environment, EU and Candidate Countries Civil Protection Authorities and interested parties.

NEDIES Disaster Reporting System. The NEDIES disaster reporting system is a repository of lessons learnt from disasters. It aims to provide lessons learnt information in the following disaster management phases: prevention, preparedness and response. Furthermore, it includes lessons learnt in disseminating information to the public in the above-mentioned phases.

With a view to this activity, the NEDIES Team encouraged Candidate Countries to request for a username and password and dynamically use the NEDIES system. By the end of 2002, almost every country had signed up to the NEDIES system. Over the course of the project, events were also contributed to the NEDIES system from PECO countries.

Data collection to improve understanding of priorities and needs relative to natural and other technological hazards (besides Seveso installations). The JRC first solicited information on natural and technological hazards other than Seveso at the March 2001 seminar and the seminar was successful in soliciting detailed information from several countries on these topics. The activities within the NEDIES side of the project, in particular the technical exchange workshops and the Internet exchange system, also contributed significantly to the JRC's knowledge of natural hazards specifically. The JRC also placed discussion of needs associated with natural and other technological hazards on the agenda of the MARS/SPIRS training meetings held in the different countries, and a list of questions was prepared in advance to support these discussions. Some countries also took advantage of the final seminar to contribute additional information on other technological hazards.

Data collection towards better understanding of disaster management in candidate countries. The project aimed to gain information about the disaster management processes in the PECO countries. To this end, it conducted a targeted survey on flood management and databases relative to natural hazards in PECO countries. Information on natural hazards priority was also requested and received through the NEDIES workshops, and the project seminars and training meetings.

Information collection regarding the application of risk mapping and information management tools. As much as possible, the JRC sought to learn about efforts in PECO countries to apply risk mapping and information management tools and systems to management of natural and technological hazards. Because of demands made on PECO countries for Seveso information, the JRC limited its efforts to obtaining a general overview of the manner and extent to which such have been applied to the management of natural and technological hazards other than Seveso.

For the most part, the JRC utilised opportunities afforded by other project activities, such as the seminars and training meetings, to build its knowledge base. In some training meetings, the JRC staff were in fact treated to demonstrations of information management systems managing hazards data. However, resources for both the JRC and PECO countries for these areas of the project did not allow exploring the details of these systems. Nonetheless, the JRC learned enough to allow the formation of some preliminary conclusions about information management applications directed towards management of natural and technological hazards in PECO countries.

Distribution of ARIPAR software. It was determined that the ARIPAR software tool might also be useful to efforts in the PECO Countries, to assess industrial risks within particular localities or regions. The software tool allows users to perform a quantitative assessment of the risks connected with processing, storage and transportation of dangerous substances in industrial areas, according to the ARIPAR methodology.[2] Given strong interest expressed by a number of countries, the JRC

[2] ARIPAR = A software tool for assessing of the risks connected with processing, storage and transportation of dangerous substances in industrial areas in order to support decision making regarding: This software was originally developed as part of a larger project of the same name, sponsored jointly by the Italian Department for Civil Protection and the Regional Authority of Emilia-Romagna, aimed at improving decision-making on industrial risks in the harbour area of the Italian city of Ravenna. With the approval of the authorities, the JRC's Institute for Protection and Security of the Citizen (IPSC) subsequently enhanced and adapted the software for use in another similar activity. The

decided to translate the software into English for general use in the PECO Countries and ideally the EU Member States as well. This software tool was distributed in pilot form to all PECO countries in October 2002.

Demonstration of JRC information management tools. Over the course of the project, the JRC completed, or was in the process of completing the development of a number of different risk-based screening tools and decision support systems. The JRC took advantage of opportunities within the project to expose the PECO countries to these instruments, and more generally, to tools for integrating management of various risks, as a way of stimulating and exploring interest in applying such tools. In particular, all the tools were part of a hands-on demonstration session at the November 2002 seminar.

The PECO countries were provided with demonstrations on the following information management systems and tools during the project (in addition to the MARS/SIRS and ARIPAR softwares):

> CommonGIS. *CommonGIS* envisions the dissemination and exploitation of geographically referenced data (henceforth called geo-data) to a broad cross-section of the public. Geo-data encompass various thematic or statistical data on demography, economy, education, culture, and history. The key-thought of CommonGIS is to make geo-data commonly accessible and usable for everyone, from everywhere, by providing a WWW-based Geographical Information System (GIS) with specific functions for the automatic generation of thematic maps.
>
> HARIA 2. The output of the HARIA-2 project is a set of models and tools for the analysis and optimisation of emergency plans, accident scenario simulation (UNI-PI) and a GIS-based tool for emergency simulation (JRC). Its aim is to model and simulate dynamic systems interacting during a severe accident in chemical and petrochemical industries, including physical systems, civil protection systems, rescue services and resources available for consequence mitigation. Accidents that can be analysed through HARIA-2 include accidents that could impact the surrounding environment, territorial and social systems, populations and other targets that could be affected by the accident.
>
> SIMAGE. The objective of the SIMAGE information management system is the design, realisation and implementation of cost-effective, operating, lasting integrated systems in highly industrialised areas for monitoring and management of environmental emergencies related to industrial accident and air quality. It provides a number of databases and a number of modelling tools available for assessing particular emergency situations in the framework of a single information management system. A joint project with Italian authorities, it is also intended to be used for information exchange concerning industrial risk, air, water, and soil, and is networked with the major existing Italian risk areas, and the planning and management of emergencies associated with industrial accidents or transportation of dangerous goods.

Joint Research Centre obtained the right to distribute software to non-profit organisations by virtue of an agreement with the Regional Authority of Emilia Romagna.

Technical Exchange on Information Systems for Managing Risk Information with Slovenia and Estonia. Through the MARS/SPIRS training meetings, the JRC found that Estonia and Slovenia had some interest in elaborating a current information management system with elements related to technological and natural hazards. As a result, the JRC set up separate bi-lateral meetings with each country, in part, to learn about their efforts and offer knowledge and information from experience. Each country was interested in learning about JRC's experiences in creating information management systems that might be relevant to similar work taking place or planned in their countries. The JRC was similarly interested in knowing more about the work of the Slovenian and Estonian experts, understanding the capabilities of their systems, and establishing a dialogue that could lead to future technical exchange and possible collaboration in future.

CONCLUSIONS

The conclusions that follow are divided into two parts to reflect conclusions from the Seveso activities, a topic that was a priority focus of the project and received a majority of project resources, and to provide conclusions from the non-Seveso activities.

The non-Seveso activities helped to establish a stronger knowledge base in relation to information management needs and priorities for natural and technological risks. It should be noted that this information has led the JRC to assign more resources to natural hazards and to risk prioritisation in the continuation of this project within the Sixth Framework Programme, particularly in the context of support for the integrated EU strategy on emergency prevention and preparedness.

These conclusions are described in more detail in the following paragraphs.

Natural and Technological Hazards: Information Management and Risk Assessment Needs

These conclusions reflect information collected over the course of the project from the Candidate Countries of central and eastern Europe. Notably, these conclusions tend to support the launching of an initiative to assess the extent of natural and technological risks in Europe as envisioned by DG-Environment in its (draft) integrated strategy[3]. The conclusions in regard to risk assessment expertise and risk management tools likewise provide valuable input to the JRC's Compass activity, an action that seeks to improve the quality of risk assessment and of informed/risk based strategic decision-making in the area of technological risk management.[4]

The following are conclusions generally about information management and risk assessment needs in relation to management of these hazards in PECO Countries.

[3] To be outlined in the anticipated Communication on Civil Protection discussed in the current Working Document on Civil Protection of 28 February 2003.
[4] Sixth Framework Programme for Research and Development (2002-2006). Thematic Sub-Priority 4.3.3.5.: Comparability of Technological Risk Assessment Capabilities.

Priority hazards in PECO countries

- Most common hazard priorities. Among the ten hazards selected for the project, hazardous installations, transport of dangerous goods, transboundary pollution, floods and forest fires were most commonly perceived as of medium or high relevance to the PECO countries (eight out of ten, according to the Risk Relevance Survey). Contaminated lands and pipelines are of some significance in about half the countries.
- Other important hazards. Other hazards, especially landslides and earthquakes, are of importance to only a limited number of countries (Bulgaria, Slovakia and Slovenia). However, in these countries, these risks are of such high concern (particularly, earthquakes) that any JRC effort to address natural risks in these countries must take them into account. Furthermore, these risks are shared by certain Member States and the JRC who have worked together in recent years to improve technological capacity for addressing these hazards. The JRC can serve a valuable role in sharing the knowledge gained from past work with EU Member States and in linking the various efforts within Europe, western, eastern and central, to further promote research and the development of appropriate technical applications.
- Wide variation in needs and priorities. Information gathered in the project also showed that needs and priorities associated with management of particular risks varied widely between different countries. Although two countries might assign high importance to a particular hazard, they often identified very different needs in relation to it. For example, where one country might focus on improving emergency preparedness, another country might place emphasis on improving physical infrastructure. Such knowledge is helpful in the development of collaborative relationships and technical exchange activities. Although, in each case, their efforts could be further enhanced by risk –based decision-making tools, it is important to understand that the application of the tools in each country could be very different.

Information Management Systems: Current status and future needs

- General constraints. On the whole, the development of sophisticated information management systems that can map data in detail and also apply the data to analytical uses requires significant resources. The information management expertise is relatively strong in the PECO countries, so that the constraint is largely financial resources. Whereas the application of risk-based screening and other decision making tools is also constrained by the limited expertise available in risk management in several PECO countries.

  The experience and knowledge gained through this project lend support to the goals of DG-Environment's planned Communication on Civil Protection regarding the improvement of public awareness and safety in the face of natural and man-made hazards.
- Data management systems. Data management systems for managing hazards are of interest to some countries, and in particular, systems that can manage data

from multiple hazards. A few countries are at the beginning stages of developing such a system. Notably, Estonia and Poland have just adopted legislation that requires them to build a comprehensive information management system for maintaining data on natural and technological hazards. Slovenia has already developed a spatial database that covers the major hazards of the country and is planning to incorporate programmes that provide analysis across hazards to support emergency response planning and prevention. Poland also intends to build a system that will address needs related to multiple hazards as part of implementation of its Natural Calamities Act. The JRC also noted that countries with high exposure to a number of natural and technological risks, showed strong interest in applications that allowed decision-making across risks.

- Information management tools. Information management tools that support management and analysis of data for multiple hazards are of interest to all countries. Although the JRC did not gather enough information about information management applications in this area to make a solid judgement, some preliminary impressions were formed from the information that was provided by PECO countries. In particular, several countries are concerned about the risk of one disaster event triggering another, particularly in the case of flood events. In the past three years two flood events have resulted in a chemical spill into water. In one case, the downstream consequences were severe and were the cause of transboundary pollution in a neighbouring country. These events have stimulated strong interest in improving forecasting abilities that may lead to better prevention of these types of disasters.
- Risk based-screening tools. Only a few countries appear to be applying risk-based screening tools in risk management of natural and technological hazards. For example, Poland has been developing and applying risk-based screening tools, including an application of the IAEA methodology and a decision support system for emergency response in case of chemical accidents (the SWAR system). Other countries, such as Hungary and Czech Republic, also appear to be applying or moving towards application of such tools.
- Risk mapping. The JRC has formed the impression that electronic mapping of natural and other technological hazards is progressing in all countries, and it is probable that the level of detail and the interactive capability of different systems vary widely. Some of the countries appeared to have mapped some of the hazards electronically. However, detail and completeness of this mapping is not known.

Knowledge gathering and information exchange

- Technical exchange between Candidate Countries and the Member States. Technical exchange through workshops, forums and training sessions continue to be very useful as they provide a platform for dialogue and exchange of lessons learnt and experience in the field of natural and technological risk management between EU and Candidate Countries. With a view to the Enlargement process, these meetings paved the way for close collaboration between the competent authorities of the present and forthcoming members of the EU.
- Future project information needs. Given the uniqueness of actors, organisation structure and processes for managing natural hazards and disasters in each PECO Country, it is clear that identifying common approaches and tools requires more

detail than the JRC has currently collected. Information about the type and character of data available, current uses and applications, distribution of hazard management functions, and other aspects of natural risk management would help to support a targeted strategy of technical assistance and collaboration in risk management.

Progress in Seveso Implementation and Further Technical Support Requirements, including Risk Assessment

The Seveso activities allowed the JRC to form important conclusions relative to the needs and priorities of Seveso implementation, including the development of information and risk management systems. These conclusions are also reflected in the Seveso portion of the Sixth Framework Programme.

Seveso Implementation: Current Status and Current Challenges

- 1.104 new Seveso installations. The accession of the 10 central and eastern European countries in 2004 will bring in a significant number of hazardous installations required to comply with the Seveso Directive. There are an estimated 1.104 Seveso installations in central and eastern European countries of which 835 may be required to comply with the Directive before 2005. The increase is expected to augment total Seveso installations in Europe by fifteen to twenty percent once accession of all ten countries has occurred.
- Status of Seveso implementation. Six countries have completed transposition of the Directive and have started implementation; the remainder are actively preparing for implementation. Training, awareness and programme development activities are well underway in all countries. Whether in the implementation or the preparation phase, every country is currently devoting considerable resources to raising awareness of the new requirements in government and industry, providing specialist training to competent authority staff, evaluating possible approaches to risk assessments, developing technical guidance, testing strategies through pilot projects, establishing programmatic structures and procedures, and building information systems for managing specific tasks and information.

  The Seveso Directive represents an approach to accident prevention of a substantially higher level than is currently in place in candidate countries. Effective implementation following transposition of the Seveso Directive in reality will take time and the availability of appropriate expertise and implementation tools could accelerate this time frame. Existing expertise and infrastructures for managing industrial risks must likewise be substantially adapted to accommodate this dramatic change of approach.
- Assistance from the European Community. Funding and expertise from within the European Community for Seveso implementation have made valuable contributions to Seveso implementation in PECO countries. Implementation in candidate countries appears to benefit from technical exchange with other countries and access to their expertise. In particular, there have been tangible gains in knowledge and implementation tools and strategies from interactions with EU experts through PHARE twinning projects and through European Commission technical support activities sponsored by DG-Environment and the

JRC. Additionally, technical exchanges occurring under the umbrella of European and international co-ordination efforts for implementing accident prevention protocols have also been valuable forums for information exchange.

- Availability of necessary expertise. According to most countries, expertise in core disciplines, namely, risk assessment and industrial safety management, available within the competent authorities is relatively low. These two competencies are central to effective strategic planning and implementation of many provisions of the Directive, including the evaluation of safety reports, conduct of inspections, and land-use planning. However, many countries are only at the beginning in developing their strategy and in training personnel. Moreover, expertise in risk assessment or development of safety management systems does not appear to be widespread in their industries.

- Responsibilities of the competent authorities. Shared responsibilities and decentralised functions may place an extra burden on training and development of expertise for enforcing certain areas of the Directive in some countries. Distribution of responsibilities across a wide spectrum implies the need for good co-ordination and the application of a shared approach to Seveso enforcement, including criteria and methodology.

Information Management for Seveso Implementation

- Resource limitations. The capacity to apply information management tools to spatial and quantitative analysis of data is limited in many countries. Some countries face a logistical challenge, others lack the proper data, and some countries are confronting both these obstacles. Obtaining computer equipment is a resource problem for many countries, both in terms of purchasing updated software and customised programmes but also in terms of volume of equipment, whereby many local and regional authorities do not have access to updated equipment, or to any computers at all, in some cases.

- Hazard mapping. Hazardous installations data are not fully mapped or categorised in all the PECO countries and the JRC does not yet have a complete inventory in SPIRS of Seveso installations that are expected to be covered by the Seveso Directive in these countries. Some countries have supplied the JRC with data but not all their installations have been geo-referenced or organised in the SPIRS structures. Other countries have failed to provide JRC with the data for security reasons or on the grounds that sharing such data with the Commission should take place only after accession.

  In regard to data, GIS information is available for administrative divisions and land cover (natural features, population, etc.) of all countries. However, few countries have population and population density mapped in any useful detail and this deficiency impedes the capacity to perform some types of spatial risk assessments and risk-based screening (e.g., where human consequences are involved). For a small number of countries, access to geo-referenced data and GIS software may also be a limiting factor.

- Information management and risk assessment tools. All countries are looking for information management and risk assessment tools that could enhance Seveso implementation, or are interested in developing or adapting tools for customised use. Many countries are planning to develop relational databases for maintaining hazardous installations data and tracking enforcement activities. All countries appear interested in obtaining tools for enhancing spatial and quantitative analysis of industrial risk. Several have experimented with the ARIPAR tools developed by the JRC and one country is already planning to apply these tools in a pilot project on risk assessment within the framework of a Phare project.

RECOMMENDATIONS

The themes addressed in this project continue to be relevant within the Sixth Framework Programme of Research and Development (2002-2006). The application of risk and impact assessment and forecasting, and decision support methodologies are specifically targeted in the Programme as key mechanisms in the control of desertification and impacts of natural hazards.[5] The Programme also emphasises efforts to achieve sustainable hazard reduction and the need "to create a maximum of synergy with other European, national or regional programmes, in particular with regard to the needs of Candidate Countries."[6] Furthermore, the European Union's Sixth Environmental Action Plan seeks to "intensify efforts at the international level to arrive at consensus on methods for the evaluation of risks to health and the environment, as well as approaches of risk management including the precautionary principle ... "[7] To assist in fulfillment of this objective, DG-Environment is developing the integrated EU strategy on emergency prevention and preparedness.

Recommendations in this section are aimed primarily at future activities of the JRC, and there has been no attempt to make recommendations outside this context. They are also intended to support strategies of risk reduction and risk management as described in the integrated EU strategy on emergency prevention and preparedness, and the Sixth Framework Programme as it evolves to support this strategy.

The recommendations that follow are divided into two parts to reflect recommendations related to Seveso activities, a topic that was a priority focus of the project and received a majority of project resources, and recommendations related to the non-Seveso activities. The non-Seveso recommendations are centred on needs and priorities in relation to natural and technological risks, from a general standpoint and they are reflected in the continuation of this project in the Sixth Framework Programme.

These recommendations are described in more detail in the following paragraphs.

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[5] Sixth Framework Programme for Research and Development (2002-2006). Thematic Sub-Priority: 1.1.6.3 Global Change and Ecosystems, Topic Area 4: Mechanisms for Desertification and Natural Disasters

[6] Sixth Framework Programme for Research and Development (2002-2006). Thematic Sub-Priority 3.4.3.2.: Systems Research and Hazard Control.

[7] Decision No. 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme (OJ L 242, 10.9.2002).

Support to Information Management and Risk Assessment Applications for Management of Natural and Technological Risks

Given that PECO countries share certain priorities related to natural and technological hazards, the JRC believes that it is worthwhile to explore further the possibility of supporting risk management of these hazards.

- Continuation within the Sixth Framework Programme. Through the MAHB/NEDIES project, a solid foundation has been laid for sharing information and knowledge concerning the management of natural and technological risks between the JRC and eastern and central European countries. The technical exchanges throughout this project have been mutually beneficial to the JRC and the eastern and central European countries. The JRC should build on this foundation. It has put forth a specific proposal to do so as part of a JRC enlargement activity within the Sixth Framework Programme.
- An opportunity to support harmonisation of risk management approaches. Moreover, many of the Candidate Countries are still in the process of establishing methods and institutionalising procedures. They are open to incorporating new tools and working with these countries on new applications may open the way for greater harmonisation of data management and risk assessment approaches in Europe. As such, they stand to benefit in particular from a successful outcome of the JRC's Compass activity.
- Continuation of knowledge gathering to help direct future Community actions. The JRC was able to confirm that there are a number of natural and technological risks of high concern in Candidate Countries. Further interaction with Candidate Countries to learn more about approaches to managing these risks, and tools applied in managing these risks, could be of great value to current European initiatives in these areas. In particular, it could support actions to promote risk mapping and combined risk characterisation as outlined in the integrated EU strategy on emergency prevention and preparedness currently in development within DG-Environment. Additionally, such information could be of great value to current Community efforts to harmonise technical approaches and raise the level of risk management expertise in Europe
- Benefits of future technical support and collaboration. The JRC should continue to offer its expertise in risk assessment and information systems for building expertise and infrastructure in this area in PECO countries. This support could consist of bi-lateral or multi-lateral collaborative work with PECO countries on the development or adaptation of risk assessment methods for specific uses, and development and application of information management and risk-based screening tools. Such collaborations could lead to general advancement of research and technology efforts in the field of risk management and civil protection. Specifically, the JRC could consider applying its expertise in the context of information management tools that could support data management or data analysis across hazards, both natural and technological, for analysis in localised areas.
- Pilot projects in risk assessment of natural and technological hazards. The project underscored the variation in the current objectives and perceived needs of each country's programme for managing particular natural and technological risks. Given this variety, the JRC might attract and sustain successful

collaboration with Candidate Countries if projects could be tailored, as much as possible, to meet specific priorities and needs of each country.

The pilot project approach offers a means to do so, by testing the benefits of particular approaches and tools applied to specific situations on a small scale. In particular, preparation and agreement to collaborate on pilot projects is generally achievable in a small time frame, particularly when strong working relationships have not yet been fully established between the parties. Such projects can also bring meaningful results to participants within a reasonable time period. As such, the pilot project model could be a mechanism for constructive collaboration with Candidate Countries for management of natural and technological risks, and at the same time, contribute to the formation of possible future Community initiatives in this area.

- <u>Risk mapping.</u> The JRC is in a strong position to develop further co-operation with PECO Countries on risk mapping. Some countries have already shared considerable information concerning natural and technological risks and their own risk mapping efforts. There is an interest in some, if not all countries, in developing more comprehensive electronic maps for managing natural and technological hazards. Moreover, working with Candidate Countries in testing and applying JRC's GIS-based mapping tools could also contribute to the harmonisation of procedures and standards related to risk assessment and mapping of natural and technological disasters within these countries.
- <u>Information and risk management tools.</u> It has proved worthwhile for the JRC to distribute and support the application of the data management and risk-based screening tools it has already developed. The JRC should continue to consider creating products aimed at improved risk assessment that can be used by a number of Member States and Candidate Countries.
- <u>Risk assessment of contaminated lands.</u> Given the interest in applying risk assessment to contaminated lands, the JRC could consider developing a project to test applications of various risk assessment methodologies in this field. It could draw on the modeling expertise already available in the JRC and experiences and knowledge gained through development of the European Soil Information System (EUSIS).

Technical Support to Seveso Implementation

Given the status of implementation in each country and particular challenges that could slow the pace of progress, the JRC believes there are several areas where ongoing technical support of Candidate Country efforts could add value. Any such support activity should take into consideration the recommendations that follow.

Recommendations in this section are aimed primarily at future activities of the JRC within the Sixth Framework Programme, and there has been no attempt to make recommendations outside this construct. Moreover, based on its experience with the PECO countries, the JRC could consider extending its support activities to all Candidate Countries and it has recommended doing so in the enlargement project for management of natural and technological hazards in the Sixth Framework

Programme. Therefore, the recommendations below have been designed to include all Candidate Countries.

- Continuation of Seveso technical support in the Sixth Framework Programme. Seveso implementation programmes in Candidate Countries continue to benefit from access to EU expertise and implementation tools and the JRC can make a valuable contribution in this regard. The JRC has specific expertise in a number of areas that support Seveso implementation, industrial risk assessment, and development and application of data management, data analysis and decision support tools, and general application of the Directive in the Member States. In addition, through collaborative research projects and expert workshops, the JRC can also facilitate access of the Candidate Countries to expertise and tools available in the Member States. These activities have already been included in the MAHB/NEDIES project under JRC enlargement in the Sixth Framework Programme.

  The contribution of JRC resources will have a maximum effect from now on to the next three to four years, as implementation programmes are being launched and tested. During this time all the Candidate Countries will be establishing and testing administrative procedures, building information management infrastructure, carrying out training programmes and establishing and testing criteria and methodologies to guide enforcement.

- Variation of priorities and needs between countries. It may be beneficial to offer participation options to Candidate Countries within the new JRC enlargement project on this topic in order to accommodate different needs in relation to technical expertise. The level of expertise required for enforcing different provisions, for example, performing risk assessments or developing land-use planning strategies, can vary substantially from country to country. The need for implementation tools, such as data management or risk assessment software, and the need for information on best practices in various programme areas, e.g., inspections and land-use planning, may also be of different proportion in different countries. The number of staff needing a certain type of information, and their distribution in terms of competency, location or other factors, may also vary.

- Difference in stages of implementation between countries. It may be beneficial to offer options for project participation that accommodate Candidate Countries in different stages of implementation. In the early stages of implementation, countries have the strongest need for information about practices related to risk assessment and the evaluation of safety reports and safety management systems. Knowledge and tools to implement inspection practices, emergency planning, land-use planning and provide information to the public become more critical at later stages, as countries approach safety report deadlines.

- Broad access to Seveso information and information management tools. It may also be useful to consider options that allow broader distribution and access within the Candidate competent authorities to certain information and tools developed within the project. Often various responsibilities and functions associated with Seveso implementation are shared by more than one competent authority or are exercised by personnel operating out of a number of different geographical locations. The JRC should take into consideration how the structure and documentation of project actions can best be developed to provide the best value in exchange for effort.

- Opportunities for collaboration on risk assessment. The JRC should continue to seek opportunities to work bilaterally and multilaterally with Candidate Countries on Seveso-related research, in particular in the area of risk assessment. There is a substantial need to build expertise in this area for Seveso implementation in Candidate Countries. Hosting detached national experts or visiting scientists from Candidate Countries to work on common research objectives related to Seveso II is one way of directly assisting countries in building their expertise. Another option is funding participation of Candidate Countries in direct collaborations with the JRC on research. Collaborations with the JRC hold a double advantage in that they help build expert knowledge in the Candidate Countries but also contribute to overall knowledge in this area.

- Opportunities for collaboration on information management tools. The JRC should continue to seek opportunities to work bilaterally and multilaterally with Candidate countries on the development of information management software and systems to support Seveso implementation. JRC expertise in the development of GIS, data management, data analysis, and decision support tools has already been applied successfully to a number of risk management scenarios, including industrial risk management. Candidate countries are already seeking information management tools to enhance administration and enforcement of Seveso requirements, and the need to develop and adapt information management tools for this use is expected to persist over the next several years.

- Management of hazardous installations data. Assistance is needed in some Candidate Countries to manage and analyse hazardous installations data; moreover, sharing this data with the JRC should be encouraged. Hazardous installations databases are not complete in some countries, and in other countries certain data elements are lacking. In particular, the ability to map installations electronically and the breakdown by industry sector should be uniform or nearly uniform in Europe. Moreover, sharing the data with the Commission helps to support its efforts to represent competent authority interests on questions at a European level relating to major hazard control.

- Exchange of best practices. The JRC can support opportunities to share best practices for Seveso implementation between Candidate Countries and Member States. Participation of Candidate Countries in EU technical working groups, such as the Technical Working Group on Land-Use Planning managed by the JRC and the programme for Mutual Joint Visits on Inspections Under Seveso II are valuable forums for sharing information and contributing to the development of best practices. In addition, the JRC can also encourage participation of Candidate Countries in EU-funded shared-cost research projects that support Seveso implementation.

- Training. JRC courses and workshops to provide training on software support tools for Seveso II and on Seveso implementation remain relevant mechanisms for creating the necessary skill base and knowledge base within competent authorities. The MARS/SPIRS software training was successful in introducing Seveso reporting software and JRC resources and expertise to competent authority staff. A software demonstration session at the end of the November seminar in Ispra was also considered a useful experience for the participants.

During the next several years, the Candidate Countries will continue to have a strong demand for training of competent authority staff. Therefore, any contribution to training that the JRC can offer in relation to its competence would be welcome. Training to support the use of software, risk assessment techniques or general implementation of the Directive are an example of some areas where the JRC could add some value.

In the following chapters, these conclusions and findings are explored in detail. Priorities and needs in relation to management of natural and technological hazards as expressed by the PECO countries over the course of the project are summarised in the tables that follow.

Summary of Priorities and Needs as Described by PECO Countries[8]

Table E1: Priorities and Needs for Technological Hazards in PECO Countries

Topic Area	Priorities/Needs
Technological Hazards	
Technological Hazards, Generally	1. To implement a good emergency plan which covers prevention and response to all technological and natural hazards (BG) 2. To acquire proper equipment for responding to technological disasters (LV)
Hazardous Installations	3. To develop a good programme for industrial risk assessment and management (BG) 4. To implement training in Seveso II issues, including assessment of documentation, performing inspections, etc. (BG) 5. To implement a good programme of preparedness for and prevention of chemical accidents (LT) 6. To build expertise in risk assessment and evaluation methods for industrial hazards (LT) 7. To complete development of an information management system for managing industrial accident prevention and response (LT) 8. To acquire improved emergency detection and support systems for industrial hazards (LT) 9. To ratify the Convention on the Transboundary Effects of Industrial Accidents (PL) 10. To ensure that industrial hazards are properly taken into account in land-use planning, applying appropriate methodologies and criteria (SLO) 11. To improve the quality of inspections and accident reports required under Seveso II (SLO) 12. To reduce risk posed by hazardous establishments by introducing prevention, preparedness and response measures (H) 13. To develop an industrial accident information system (H) 14. To review existing emergency plans based on safety reports of Seveso establishments (H) 15. To develop existing research infrastructure for major industrial hazards (H)
Contaminated lands	16. To assess and clean up contaminated lands (BG) 17. To develop and apply assessment tools to make decisions involving contaminated lands, oil-shale mining, wastes and natural hazards (EST) 18. To obtain the necessary financial resources to address the problem of contaminated lands (LV) 19. To develop and apply appropriate methodologies for risk assessment of contaminated lands (LV) 20. To acquire necessary analytical equipment and technology for monitoring and analysing contaminated lands (LV)
Oil-shale Mining Waste	15. To develop and apply assessment tools to make decisions involving contaminated lands, oil-shale mining wastes and natural hazards (EST)
Pipelines	Not mentioned
Transport of Dangerous Goods	21. To prevent and limit accidents occurring through the transport of dangerous goods, especially road transport (BG) 22. To reduce risk posed by transportation of dangerous goods (H) 23. To develop risk assessment tools for the prevention of transport accidents (H)
Transboundary Pollution	24. To elaborate and implement measures to limit transboundary pollution (BG) 25. To obtain equipment for adequately monitoring pollution (LV) 26. To improve monitoring of the surface waters in Hungary and maintain good quality (H) 27. To implement the decisions of the Conference of the Parties for the UNECE Convention on the Transboundary Effects of Industrial Accidents (H)

[8] These priorities and needs were compiled from presentations made in the seminars and training meetings held in support of this project, and also from responses to JRC's Risk Relevance Survey completed by PECO Countries in November 2002.

Table E2: Priorities and Needs for Natural Hazards in PECO Countries

Topic Area	Priorities/Needs
Natural Hazards	
Natural Hazards, Generally	1. To implement a good emergency plan which covers prevention and response to all technological and natural hazards (BG) 17. To develop and apply assessment tools to make decisions involving contaminated lands, oil-shale mining wastes and natural hazards (EST) 28. To acquire general knowledge about natural disaster preparedness and response (BG) 29. To prepare up-to-date assessments of threats from natural hazards (SLO)
Floods	30. To improve the flood prevention infrastructure (BG) 31. To improve the flood prevention infrastructure (CZ) 32. To improve the flood prevention infrastructure (RO) 33. To develop non-structural measures, e.g., improved legal and operational framework, for flood prevention and strategic intervention (RO) 34. To improve early warning capabilities for storms and floods (RO) 35. To implement the new anti-flood programme and associated flood control measures (SK) 36. To conduct research to support implementation of the new anti-flood programme (SK)
Forest Fires	37. To create good organisation measures to prevent and fight fires (BG) 38. To improve risk assessment techniques to better anticipate the occurrence of forest fires (RO)
Landslides	39. To implement improved landslide control measures (RO) 40. To complete field studies of landslide areas (RO)
Earthquakes	41. To identify communities and buildings in high risk seismic zones (RO) 42. To select facilities for seismic risk mitigation funded by national and international projects (RO)

Table E3: Priorities and Needs by Selected Types of Activities[a]
Management of Natural and Technological Hazards in PECO Countries

Topic Area	Priorities/Needs
Priorities and Needs Classified by Selected Types of Activities	
Risk Assessment	3. To develop a good programme for industrial risk assessment and management (BG) 6. To build expertise in risk assessment and evaluation methods for industrial hazards (LT) 17. To develop and apply assessment tools to make decisions involving contaminated lands, oil-shale mining wastes and natural hazards (EST) 19. To develop and apply appropriate methodologies for risk assessment of contaminated lands (LV) 23. To develop risk assessment tools for the prevention of transport accidents (H) 29. To prepare up-to-date assessments of threats from natural hazards (SLO) 38. To improve risk assessment techniques to better anticipate the occurrence of forest fires (RO) 41. To identify communities and buildings in high risk seismic zones (RO) 43. To apply appropriate methodologies for risk assessment (BG)
Information Management	7. To complete development of an information management system for managing industrial accident prevention and response (LT) 13. To develop an industrial accident information system (H) 44. To develop modern computer, information and communication tools for supporting rescue and crisis management (PL) 45. To review and revise the information management system for disaster emergencies (SL)
Emergency Preparedness	1. To implement a good emergency plan which covers prevention and response to all technological and natural hazards (BG) 2. To acquire proper equipment for responding to technological disasters (LV) 8. To acquire improved emergency detection and support systems for industrial hazards (LT) 14. To review existing emergency plans based on safety reports of Seveso establishments (H) 46. To prepare a co-ordinated Book of Rules for disaster management (H) 47. To develop an integral rescue and crisis management system in accordance with the National Calamities Act (PL) 48. To organise, train and equip emergency response teams in keeping with best practices (SLO)
Integrated Risk Assessment and Management	1. To implement a good emergency plan which covers prevention and response to all technological and natural hazards (BG) 46. To develop an integral rescue and crisis management system in accordance with the National Calamities Act (PL) 49. To improve the emergency decision-making system (SLO)
Monitoring	20. To acquire necessary analytical equipment and technology for monitoring and analysing contaminated lands (LV) 22. To improve monitoring of the surface waters in Hungary and maintain good quality (H) 25. To obtain equipment for adequately monitoring pollution (LV) 34. To improve early warning capabilities for storms and floods (RO)
Research	15. To develop existing research infrastructure for major industrial hazards (H) 36. To conduct research to support implementation of the new anti-flood programme (SK)

[a] This table does not include a complete list of all the priorities and needs, but only those that fall in the categories listed in the table.

Chapter 1   Project Description and Work Plan

Following the association of ten Central and Eastern European Countries (PECO)[9] to the framework programme in 1999, the JRC launched a special initiative dedicated to co-operation with these countries. Project PA No. 26, "Management of Natural and Technological Hazards", is one of 18 priority projects contained within the "JRC Enlargement Programme" which is aimed at supporting and addressing the needs of the candidate accession countries in their pre-accession process. The project was initially intended to create central information systems to support management of risk and emergency situations due to natural and technological hazards and to the existence of heavily polluted land sites. This paper describes the project organisation, structure, outcome and achievements and offers relevant recommendations for future work in this area.

1.1 Project Background and Purpose

Within the European Union the development of tools and methodologies for assessing risk and making risk-based decisions has become a priority in the management of a variety of natural and technological hazards. On an ever-increasing basis, terms such as risk criteria, risk analysis, risk communication and risk mapping are incorporated into Community proposals and strategy papers related to civil and environmental protection. As a result, a number of collaborations among Member States have been launched, many of them Community-funded, to learn from each other's experiences in this area, share technical information and develop solutions to common problems.

The project on management of natural and technological hazards in PECO countries was conceived as a way of augmenting the resources and expertise of PECO countries in this area, and in particular to augment their ability to collaborate as equal partners with the European Community on civil protection matters in preparation for accession. It was also expected to create and enrich networks for exchanging knowledge on natural and technological risks among Accession Countries and between Accession Countries and the European Union. Moreover, it was assumed that all the countries faced at least one common risk priority that would motivate their participation in the project: risk management of hazardous installations. Implementation of Council Directive 96/82/EC (the Seveso II Directive) is the European law targeting prevention of major-accident hazards involving dangerous substances and depends largely on risk assumptions relative to the presence of dangerous substances at particular facilities.

The project was proposed by the Technological and Economic Risk Management (TERM) Unit of the Institute for the Protection and Security of the Citizen (IPSC) which has long experience and a wide range of expertise in the field of risk management. Centres of relevant expertise within the Unit include the Major Accident Hazards Bureau (providing scientific and technical support to Seveso II Directive implementation), the Natural Risks Sectors (operating the Natural and Environmental Disaster Information Exchange System (NEDIES) project), and the

[9] Pays de l'Europe centrale et occidentale (PECO): Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia

sectors for Integration of Information for Risk and Emergency Management, and for Decision Analysis for Risk and Emergencies.

1.2 PROJECT OBJECTIVES

1.2.1. Collection and Analysis of Existing Data and Information

The first project objective was to collect data and information on natural and technological hazards in PECO countries. The project envisioned collecting data in a number of ways including through networks, workshops and surveys. It was recognised that basic information on the various natural and technological hazard priorities in PECO countries, and the status of policies to address them, would be a fundamental input to the project. Moreover, the availability and format of data relevant to these hazards was also important. In fact, the direction of the project depended largely on the discoveries made in this stage. It was expected that the findings from these inquiries revealed common challenges and priorities among the PECO countries and they would provide guidance to the JRC concerning areas where information and risk management support would be most broadly effective.

1.2.2 Creation of Regional and National Information Systems

The second objective of the project was to design and create compatible regional and national central information systems with the aim of building on existing platforms already in use within the Community whenever possible. It was thought that a number of benefits could materialise from this objective. For the PECO countries sharing geographic and risk information about hazards would contribute to efforts to co-operate on the mitigation of transboundary effects of accidents. Establishing effective mechanisms for exchanging knowledge and experience would also be of value. In the same vein it would be useful for the development of current and future European policy to maintain current information about the hazard and risk management in accession countries. Encouraging development and use of common information systems was thought to be an equally important benefit for the European community.

The deliverables of this objective would be strongly determined by the results of the data and information collection phase. The project pre-identified some possible solutions based on the expectation that certain hazards priorities, such as hazardous installations, would almost certainly be common to most PECO countries. In particular it was thought that the Seveso Plants Information Retrieval System, a software tool providing access to risk-related information relevant to hazardous installations, could be extended for use within PECO countries, who would in any event be obligated to identify and monitor of such installations to fulfil requirements of the Seveso II Directive. In addition, NEDIES, a web-based information exchange system on natural and environmental disasters, could easily be made accessible to PECO countries and by expanding the reach of the network, their participation would almost certainly enhance its value. Furthermore, the number and extent of contaminated lands within PECO countries had recently gained considerable attention and it was envisioned that a centralised system for exchanging information on contaminated soils might be a useful outcome of the project.

1.2.3. Development of Risk-Based Screening Tool for Prioritising Interventions

As a third objective the project planned for development of simple methods for the risk based screening of sites and for prioritising the interventions. It was envisioned that such methods would be developed in close collaboration with the authorities of the accession countries to ensure the use of criteria that would be in conformance with political priorities. The involvement of competent authority staff and expert organisations within these countries in the development of methods and data collection was considered essential.

1.3 PROJECT EXECUTION

An important initial task of the project was to establish a network of primary contacts for natural and technological hazards within the national governments of the PECO countries. Management of policy towards natural and technological hazards is normally shared by more than one competent authority within most countries. Moreover, the competent authorities often rely on outside experts, such as researchers and consultants, to provide technical assistance on particular points. It was thought that the project would benefit from the input of all these parties, but would be best if the parties co-ordinated internally within the country on their contributions to the project.

Therefore, letters were sent from the Director General of the JRC to the Permanent Representatives of the ten PECO Countries to build awareness about the project, but also requesting the nomination of a project focal point from within the government hierarchy. A direct request was also made to the Ministry of Environment of each country from the IPSC. The focal point would be assigned the responsibility of internal co-ordination of the country's participation in the project. Official responses to the letters were positive and the JRC also received a number of independent inquiries about the project from various experts within the PECO countries.

1.3.1 Participation of PECO Countries

The JRC was successful in obtaining broad involvement in the project from every PECO country. Early in the project each country nominated a focal point (country co-ordinator), through whom official communication about project activities, and related requests and reports were disseminated. The focal point was either from the national environmental or civil protection authority. However, in all countries, a number of departments and competent authorities were involved in the project, including both environmental and civil protection authorities, but also occupational safety, inspection and technical services, and external experts from either research institutes or a consulting company. Moreover, local regional and national authorities often participated in training activities.

It is important to note at this point that the level of participation in this project exceeded the JRC's expectations. Inevitably, because of the multi-disciplinary nature of the project, certain parts of it required the contribution of information that stemmed from specialised knowledge regarding specific hazards. Therefore, the commitment required for this project was not small, especially for the country focal point who was obliged to exercise good skills in co-ordinating with his or her colleagues in government and in expert organisations. The high quality information provided throughout the project was not only evidence of their success, but of their strong commitment to the project.

1.3.2. Establishing Common Project Priorities – the March 2001 Seminar

The JRC invited each country to send three representatives to a seminar that was held in Ispra, Italy on 14-16 March 2001. The main objective of the seminar was to obtain information that would provide direction for defining and structuring future project work. In particular, the seminar was expected to identify the minimum data needed for the project, to establish what data is available in each country, what constraints there may be on the collection of further data, and to work out how to proceed in such a collection. Given the broad nature of the subject, many countries sent representatives from more than one ministry, e.g., civil protection, environment, labour, to attend the conference as well as experts on risk management.

At the seminar each country made a presentation on the availability and use of natural and technological hazards data in their country, the types of natural hazards that are of concern, and information available on accidents that have occurred in the past. The JRC described the objectives of the project in more detail and provided examples of various information and risk management systems that might be useful to the project, including the SPIRS software tool, the NEDIES information exchange system, and other examples of data applications and risk assessment methodologies that could be used in the context of the project.

The workshop participants identified the following hazards as having the highest priority (in no particular order):

Technological Hazards

- hazardous installations
- contaminated lands
- pipelines
- oil shale mining
- transboundary pollution
- transport of dangerous goods

Natural Hazards

- floods
- forest fires
- landslides
- earthquakes

Among these, hazardous installations were named as the highest priority because they fall under the Seveso II Directive, which must be transposed and implemented prior to accession of each country as part of the *acquis communautaire.*

The participants also made recommendations concerning the future work plan of the project. They confirmed that the design and creation of compatible regional and national central information systems to assist PECO authorities in the management of natural and technological hazards is a worthwhile goal. Such a system, combined with a risk assessment methodology and prioritisation tool (for example, the IAEA risk ranking tool), would be of value to PECO countries. However, it was indicated that PECO governments would be more likely to commit to the project if its objectives were clearly aligned with existing priorities in PECO countries, such as implementation of EU directives. Therefore, the project should aim to establish a data structure for the system that would reflect hazard identification and analysis priorities of the region. It was also recognised that the project could not, at least at the beginning, demand significant resources from each country.

In addition, the participants saw the value in having a system that would allow each country to operate a local database, customised to identify and analyse hazards as necessary for local use. Given that such a system, the SPIRS software tool, was already available for use in implementing the Seveso II Directive, it was agreed that it would make sense to extend this tool for use in the Accession Countries. Likewise, they agreed that, as an established information network, NEDIES could offer immediate value to PECO countries in management of natural and technological disasters.

1.3.3. Development of a Project Work Plan

Using the feedback from PECO countries obtained at the seminar, the JRC developed a project work plan. The feedback from the workshop indicated that the project should focus on three specific themes in order to be successful: technical support for industrial hazards; information exchange on natural hazards, and definition of future technological and natural risk management priorities. Due to the requirement to implement the Seveso II Directive, most PECO countries were already in the process of revising their laws and regulations, and developing institutional and technical resources to control major industrial hazards following European community standards. Therefore, workshop participants felt that their countries would willingly commit some resources to the project if it entailed technical support on information and risk management needs related to Seveso II.

It was further recognised that, without a legal act like the Seveso II Directive, interest in the project would be less consistent for natural hazards or for the other priority technological hazards of the project. In particular, the lack of a standard European approach, such as a Directive, for managing these hazards made the starting point for such efforts much less clear. Therefore, it was determined that further study of the direction of each country's programmes and priorities would be required to develop a sense of where common approaches to management of risks would be most beneficial in the near future. Moreover, identifying opportunities for providing future information and risk management support to these natural and technological hazards was understood to be a main objective of the project.

As a consequence, project objectives related to natural hazards and other technological hazards were more modest in scope, aiming primarily to engage PECO countries in some of the JRC's information exchange activities of NEDIES and learn about their programmes and expertise through these and other interactions within the project. Slightly more resources in the project were devoted to natural hazards because of the greater interest expressed by the representatives at the seminar in these hazards. The invitation to take part in NEDIES and workshops to exchange information on specific natural hazards was received very positively. Every PECO country listed one or more natural hazards among their top priority risks and offered considerable value in relation to the resource commitment required. In part, this choice was also based on practicality, that is, many of the competent authorities managing Seveso implementation within the PECO countries also managed natural risks. Therefore, it was possible for some countries, who would be active in the project on the basis of their Seveso implementation needs, to also contribute to the natural hazards side of the project without a significant addition of resources.

Finally, the project had envisioned providing additional support on information and risk management systems for integrated risk management, that is, systems to support decisions that take all the priority natural and technological risks present in a region. It was thought that the project should solicit more information and discussion with PECO countries on this topic in order to focus this support appropriately.

Based on this discussion, the first steps in the work plan focused on obtaining a joint commitment to participate in the project from the JRC and the PECO countries. As prescribed in the work plan, the JRC also wrote a report summarising the joint conclusions and recommendations from the seminar and the PECO countries were requested to circulate the document among appropriate policy officials within the country for review and comment.

Most importantly, the JRC revised the work plan to reflect the needs and priorities identified in the seminar, as follows:

Collection and Analysis of Existing Data and Information

Information collection efforts would primarily be focused on obtaining comprehensive information about the availability and quality of data that existed in PECO countries to support implementation of the Seveso II Directive, particularly data on the quantities and types of dangerous substances present in hazardous installations. In the natural hazards area, an intensive effort would be launched to encourage participation of PECO countries in NEDIES.

Collection of Data and Information on Seveso Implementation and Training Needs

Whereas the first objective concentrated on understanding data collected and managed within the PECO countries, this objective was designed to collect further data and information about the capacity of each country to manage and evaluate data. Seveso was also identified as the principal target under this objective. Therefore, after this objective was modified to specifically include intelligence-gathering on information systems and risk assessment capabilities in relation to Seveso II. Moreover, understanding the progress of each country towards implementing Seveso II, and its organisation and structure, also appeared to be critical background information for this exercise. Plus, detailed knowledge of Seveso implementation was recognised to be of value to both JRC and DG-Environment, as well as the Committee of the Competent Authorities for Implementation of Seveso II. This aspect was therefore incorporated into this objective as well.

For natural hazards, the JRC proposed a series of workshops devoted to furthering its understanding of natural hazards priorities within PECO countries, and exploring commonalities and exchange experiences. Through direct interactions with each country, the JRC would also seek to gain basic knowledge about information systems and mapping capabilities in each country relative to natural hazards, and the structure and organisation of natural hazards management in the competent authorities.

Training and Research in Risk Assessment Applications

It became evident early in discussions with PECO countries that building capacity in risk assessment for hazards management was considered essential to the success of hazard management strategies, and particularly implementation of the Seveso II Directive. In its design the project had originally envisioned collaborations with the PECO countries primarily for the development of information management systems, particularly data management and risk-basked screening tools. However, many countries indicated that an equal or greater need existed in regard to the application of risk assessment concepts to management of hazardous installations, above all, but also to management of natural hazards and in decisions involving risks stemming from multiple hazards. As a result, the JRC included training and research in risk assessment applications in the final work plan.

Development and Dissemination of Information Management and Risk-Based Screening Tools

In the March 2001 seminar it was proposed that JRC share its software for managing data on Seveso installations and for managing major accident hazards (the MARS[10]/SPIRS[11] software). Sharing of other tools, such as ARIPAR[12], would also be considered over the course of the project. In particular, the JRC would seek to apply knowledge gained through its activities under the other two objectives, to identify other software tools that could be of use to certain PECO countries or opportunities for bilateral or multilateral collaboration on other techniques and tools for decision-making in the management of natural and technological risks. This objective would also explore whether management of various natural and technological risks could be enhanced through integrated management of these risks at the local or regional level. Such tools could take into account the presence of more

[10] MARS = Major Accident Reporting System. According to Article 19 of the Seveso II Directive, "The Commission shall set up and keep at the disposal of Member States a register and information system containing, in particular, details of the major accidents."

[11] SPIRS = Seveso Plants Information Retrieval System. This software tools allows mapping of all major hazardous industrial establishments in Europe together with information on their basic risk related characteristics. The data is treated confidentially by the EC and the Member States.

[12] ARIPAR = A software tool for assessing of the risks connected with processing, storage and transportation of dangerous substances in industrial areas in order to support decision making regarding:

Table 1.1: Project Work Plan

ACTION ITEM	RESPONSIBLE PARTY
Project focal points	PECO countries appoint official focal point to project following March 2001 seminar and affirm their comment to the project.
March seminar report	JRC produces seminar report and distributes to PECO countries for review and comment. The final document is an agreed outcome of the seminar between the JRC and PECO countries.
Dissemination of MARS/SPIRS software tools	The JRC disseminates MARS/SPIRS software to PECO Countries
SPIRS/MARS software and risk assessment training	JRC provides MARS/SPIRS training on-site in PECO Countries. Training meetings are used as an opportunity to gain more information about management of hazardous installations, including Seveso implementation progress, and information management and risk assessment approaches. Priorities and needs related to natural and other technological risks are also discussed.
Collection of existing data and information relative to hazardous installations and Seveso II implementation	The JRC develops a two-part strategy to collect information on risk management of hazardous installations in PECO countries. One part aims at data collection and management in PECO countries, through the dissemination of a survey to PECO countries. The other part consists of a focused effort to obtain answers to a number of pre-defined questions about Seveso implementation.
Technical exchange on risk assessment of hazardous installations	Discussions on risk assessment are an important part of seminars and training meetings of the project. Training meetings mostly discussed principles and types of approaches being adopted in different countries. The possibility of future collaboration on risk assessment projects was also addressed, including the assessment of other technological risks, in interactions at seminars and MARS/SPIRS training meetings.
Lessons learnt through NEDIES workshops	PECO countries are invited to share experiences and information on natural disasters with Member States at workshops organised by the JRC's NEDIES team.
Participation in the NEDIES disaster reporting system	PECO countries are encouraged to take advantage of this resource by subscribing to the site to learn about experiences within other competent authorities with natural and environmental disasters. They are also encouraged to contribute descriptions of their own events.
Data collection on natural and other technological hazards	The JRC develops a strategy to also learn more about priorities and needs related to natural and other technological hazards, particular in the areas of information management and risk assessment, in the course of conducting other activities of the project.
Data collection towards better understanding of disaster management in candidate countries	The JRC conducts a survey on flood management and databases relative to natural hazards in PECO countries. Information on natural hazards priority is also requested and received through the NEDIES workshops, and the project seminars and training meetings
Distribution of ARIPAR software	The JRC translates the ARIPAR software into English and distributes it to PECO Countries.
Demonstration of JRC information management tools	JRC demonstrates other risk-based screening and information management systems and tools it has developed to stimulate discussion, interest and possible future collaborations.

than one type of hazard or situations where one type of catastrophe (e.g., floods) could trigger another type (chemical incident), so-called natural-triggering-technical ("natech") and natural-triggering-natural events.

Table 1.1 shows a general outline of the work plan that was eventually adopted. Details of sub-components addressing technological hazards, lessons learned, integrated risk management and the final seminar of the project are described in Sections 3, 4 and 5 of this report.

1.3.4 November 2002 Seminar on Project Achievements and the Future

The principal objectives of the concluding workshop in November 2002 were to summarise the project achievements and to develop a concerted vision of the direction and shape of future collaborations between the JRC and PECO countries regarding hazards management in the EU's 6th Framework Programme for Research and Technology Development. Competent authorities from all ten PECO countries were represented at the workshop. Prior to the workshop, each country had been requested to complete a "country hazard profile" survey that asked each country to indicate which hazards were highest priority in their countries and whether they felt that resources to manage these hazards were low, medium or high in relation to the need. This exercise was aimed at confirming and revising the perspectives shared at the March 2001 seminar, and also was intended to stimulate and focus discussion.

Content of the Seminar

Presentations at the seminar summarised achievements and knowledge gained through the project in the following areas:

- Seveso establishments – the status of relevant information collection activities in PECO countries
- Transposition and implementation of the Seveso II Directive in PECO countries
- Natural hazards management in PECO countries (focusing on priority hazards selected at the March 2001 workshop: floods, forest fires, landslides, earthquakes, and, because it is a trigger for some of these hazards, storms)
- Risk assessment in PECO countries, relative to natural and technological hazards
- Management of other technological hazards (focusing on contaminated lands, transboundary pollution, pipelines, oil shale mining and transport of dangerous goods) and integrated risk management (in locations where more than one hazard is present)

Each presentation was followed by a round table in which each country was asked to verify, revise or elaborate on the information presented in regard to that country. Moreover, the round tables offered each country the opportunity to define precise areas where further collaboration and support would be welcomed, and also areas where expertise had been developed and could be shared.

Following these sessions, the JRC hosted an open discussion on the possible future of JRC collaborations with PECO countries within the 6th Framework Programme. The results of this discussion are contained in the section on conclusions and observations of the workshop at the end of this report.

The last session, covering the entire last morning of the seminar, consisted of demonstrations of various software that the JRC has developed or is developing relative to technological and natural hazards management, notably focusing on mapping, visualisation, risk assessment, communication and emergency response. The softwares featured were as follows: ARIPAR, CommonGIS, SIMAGE, HARIA 2, and SPIRS/MARS. The purpose of this session was two-fold: First, it aimed to give participants an opportunity to learn more about software that JRC has developed to determine if the software itself, or certain aspects, could be applicable to their needs. Second, it had been discussed in previous sessions that some or all of the softwares might play a part in future collaborations with the JRC on risk assessment and software development. This session was introduced by brief presentations on each software, after which software "stations" were established around the conference room. Participants were encouraged to stop at each station for as short or as long a period as they preferred and ask questions about or view a demonstration of the software.

Conclusions of the Seminar

The seminar was intended to produce conclusions that would help target the JRC efforts in a possible JRC enlargement project on the management of natural and technological hazards in the Sixth Framework Programme of Research and Development. It was interesting to note that the character of discussions was far more focused and participatory than at the March 2001 seminar eighteen months previously Through the project activities during that time period, the JRC and the competent authorities had some experience working on natural and technological risk issues with each other. Also, there now existed shared knowledge about the various different competencies within the PECO countries, and their priorities and needs in relation to the priority hazards of the projects. In addition, there was a better understanding of the risk management efforts support that JRC could contribute and possibilities for collaboration.

Among the several consensus conclusions that emerged from the seminar, the following are perhaps the most significant:

- The PECO countries identified several areas where JRC could target assistance to implementation of the Seveso II Directive. These were: "best-practices", land-use planning, safety reports, domino effect, inspection systems, safety management systems, information to the public and risk assessment, and a training course (user group meeting) for MARS and SPIRS.
- In terms of natural hazards, the PECO countries indicated that JRC could be of particular value in the development of tools to facilitate the decision-making process, particularly in the areas of emergency response, prioritisation and planning of effective prevention and mitigation measures, pooling of hazard data into one database, and monitoring and forecasting.
- In addition, tools for allocating resources and making decisions in an area where vulnerable to more than one type of hazard, that is, integrated risk management, would be useful.
- The importance of ongoing information exchange on the results of projects related to Seveso risk management, either at European level or within a particular country, was emphasised. Most countries were interested in participating in a benchmarking project in risk assessment for Seveso installations using a case study approach.

1.3.5 Project Future

Discussions at the November 2002 seminar and the successes of many activities of the project have led the JRC to conclude that this project should be continued in the context of the Sixth Framework Programme. In early 2003 JRC management assigned new funding to the project which was defined on the basis of the substantial knowledge gained through this project of the Fifth Framework Programme.

Chapter 2 Profile of Hazard Priorities in PECO Countries

2.1 INTRODUCTION

The theme of management of natural and technological hazards was selected based on the pre-existing knowledge that various parts of the PECO countries are vulnerable to a number of different natural and technological hazards. In addition, the JRC has expertise in management of different natural and technological hazards that can be applied to assisting accession countries. However, natural and technological hazards cover a broad range of action areas. To be effective, the JRC felt it should aim to focus the project on a few of these areas where it could have a reasonable impact, namely, hazards that were a priority in a number of PECO countries and technical support activities where JRC's expertise was particularly applicable.

Therefore, as a first step in focusing the project, the JRC asked the PECO countries to reach consensus on a list of priority hazards for the region. In March 2001 countries were asked to provide an overview of their priorities concerning natural and technological hazards and information management systems established for their management within the competent authorities. A list of ten natural and technological hazards was selected. These priorities formed the basis of workshop, training and information collection activities conducted within the project, as well as the distribution and testing of software tools.

The information provided in this chapter provides background on the selection of ten priority hazards at the March 2001 seminar by way of explaining the background and incentives that have collectively brought these hazards to the foreground in PECO countries. It provides a general description of the overall importance of each hazard to the PECO countries, starting with a general summary based on input from competent authorities in each country. It then briefly describes the relevance of each hazard in terms of accession requirements and the context of other European, inter-regional and international agreements and initiatives.

2.2 NATURAL AND TECHNOLOGICAL HAZARDS: RELEVANCE, PRIORITY ACTIONS AND NEEDS

A key objective of the project was to gain a firm understanding of where efforts should be targeted. The JRC continued to solicit information from the PECO countries on this point throughout the project. PECO countries were specifically requested to report on their priorities in the two project seminars and a part of the MARS/SPIRS training meetings.

Towards the project end, the JRC realised its understanding and knowledge of each country's situation was still somewhat uneven. Therefore, at this point, the JRC decided to ask each country to complete a survey about the hazards covered under the project. From the survey answers, the JRC hoped to gain a general overview of hazard priorities based on a base level of information from each country.

The survey was not complicated; it was only one page (although this is not to say that it was not difficult). Each country was asked to provide its general opinion on the relevance of the hazard for the country and the level of government resources devoted to managing the hazard on average over the last five years, describing it as either

Table 2.1. Estimates[a] of Risk Relevance per Country
Year-End 2002

Country	1	2	3	4	5	6	7	8	9	10	11
BG	High	Low	Low	Medium	High	Medium	Medium	Low	Medium	High	High
CZ	Medium	High	Low	Medium	High	Medium	High	Medium	Low	Medium	Low
EST	Low	Low	Low	Low	Low	Low	Low	Medium	Low	Medium	Low
H	Medium	Medium	Low	Medium	High	High	High	Low	Low	Medium	Low
LV	High	Low	na	Medium	High	High	Medium	Low	na	Medium	na
LT	Medium	Low	Low	Low	Medium	Low	Medium	Medium	Low	Medium	na
PL	Medium	Medium	Low	Medium	High	Medium	High	Medium	Low	High	Low
RO	Medium	Medium	na	Medium	Medium	Medium	High	High	High	Medium	High
SK	High	High	Low	Low	Low	Medium	Low	Low	Low	Low	Low
SLO	Medium	Low	Low	Low	Medium	Medium	High	Low	Medium	Medium	High

1. Chemical process/storage installations
2. Contaminated lands
3. Oil shale mining
4. Pipelines
5. Transport of dangerous goods
6. Transboundary pollution
7. Floods
8. Storms[b]
9. Landslides
10. Forest Fires
11. Earthquakes

High
Medium
Low
na **Not applicable**

Relevance of the Hazard

"High" – The hazard is present within a vast majority of the country (~>2/3) due to the infrastructure or geographic character of the country, OR the hazard is confined only to particular areas but in the event of an incident, the effect could be significant for: at least one major population centre (such as a medium to large city or metropolitan area) or an important economic resource.

"Medium" – The hazard is present within a good portion of the country (~>1/3, <2/3) due to the infrastructure or geographic character of the country, OR the hazard is confined only to particular areas but in the event of an incident, the effect could be significant for: a minor population centre (a large town or small to medium-size city) or minor economic resource.

"Low" – The hazard is present within a small portion of the country (~<1/3) due to the infrastructure or geographic character of the country, AND but in the event of an incident, there is no significant effect for: minor or major population centres, minor or major economic resources.

[a] Important: These estimates are based on perceptions of representatives of the competent authorities working within the project. As such, they represent only indications of relevant importance of certain hazards in each country, and are intended to be treated as rough estimates only.
[b] The category "Storms" was added to the priority list because it may be a trigger for at least three of the other hazards (transboundary pollution, floods, and landslides).

"high", "medium" or "low" according to definitions given. In addition, each country was asked to identify specific "priorities and needs".

Figure 2.1 represents the results of that survey. It should be noted that the JRC has chosen only to show the "risk relevance" and "priorities and needs" responses in this report. At the November 2002 seminar, the JRC and the PECO countries agreed that evaluation of resource commitments was of less value to the project. It is also a particularly difficult task that cannot be addressed thoroughly by means of a simple survey. Therefore, it was determined that these results would not be useful to present in this report.

2.2.1 Summary of Responses concerning Priority Natural and Technological Hazards in Each Country

As shown in Table 2.1, the survey responses from competent authorities are useful for placing risk management activities in the context of national concerns. In particular where a hazard is assigned high relevance by some countries, and low relevance by all the others, it is clear that any future work on that future collaborations would be limited to work within only the countries having a high interest. On the other hand, where most countries have marked a hazards as moderate or high relevance, it is likely that there is broad common interest and opportunity for collaboration among a wide number of countries.

The survey responses were also helpful in focusing discussions about potential future collaborative activities between JRC and the PECO countries at the November 2002 seminar.

The results of the survey can be summarised as follows:

- Transport of dangerous goods and floods were the hazards considered a highly relevant risk in the most countries (five).
- Chemical process installations and forest fires were ranked by all but one country as either of medium or high relevance and half the countries considered contaminated lands of medium or high relevance.
- Three countries (Bulgaria, Romania and Slovenia) ranked earthquakes and landslides as moderately or highly relevant, but for the remaining countries these hazards were of low relevance or not relevant at all.

Moreover, these results also supported an important sub-theme of the project regarding the relationship between different hazards. Throughout the project, so-called “natural-triggering-technological” (“natech”) and “natural-triggering-natural” (“nat-nat”) were treated as important subcategories of integrated risk management. These risks are specifically linked to a number of hazard types, including hazardous installations, transboundary pollution, floods, landslides and earthquakes. Natech and nat-nat hazards are considered to exist in localised areas where a natural hazard is present in combination with a specific technological hazard, particularly hazardous installations, or with another natural hazard, such as landslides.

The results of the risk relevance survey imply that natech and nat-nat risks could be found in localised areas of many if not all countries. Moreover, the subject of natech and nat-nat risks was raised continually throughout the project. Some countries, notably the Czech Republic and Romania, had recent experience with a severe flood event triggering a chemical release into water, notably the Czech Republic and Romania.

2.2.2 Specific Priorities and Needs Identified by Each Country Relative to Natural and Technological Hazards

To reinforce selection of priorities, the JRC asked the PECO countries what they considered were the highest priorities and needs in regard to technological and natural hazards in their countries. Countries were asked to specifically respond to this question at the March 2001 seminar and in the Risk Relevance Survey that they completed in November 2002.

In the Risk Relevance Survey, some countries listed priorities and needs separately, but others simply provided a consolidated list without distinguishing one from the other. For reasons of practicality, this report also lumps "priorities and needs" together.

The specific priorities and needs are only intended to complement the risk relevance information provided by each country. Some countries did not specify needs in relation to all hazards of medium or high relevance in their country. Such omissions should not be viewed as contradictory to the country's prior statements about risk relevance. It should be assumed that there exists a general need to implement effective risk management in all these areas because the project's priority hazards were selected by the countries themselves.

Responses cover a cross-section of the priority hazards covered in the project. There is no pronounced imbalance in responses, except perhaps in the area of Seveso hazards. Because of the emphasis on Seveso hazards in this project, almost all focal points were sensitised to the importance of Seveso implementation, and many were directly involved in it within their own countries.

Table 2.2 summarises responses that pertained to technological hazards, Table 2.3 summarises responses relative to natural hazards and Table 2.4 classifies each response by selected types of activities.

Technological Hazards

Under technological hazards, not surprisingly, most responses pertained to hazardous installations. A good number of the focal points for the project were directly involved with Seveso implementation and therefore, it was expected that they would identify some needs in this area. However, in general, respondents covered a cross-section of the priority hazards covered in the project and therefore, their answers touched on a number of different hazards besides Seveso and also horizontal issues relating to hazard management generically. Contaminated lands was also mentioned in connection with specific needs by three countries, and oil-shale mining, transboundary pollution and transport of dangerous were all mentioned at least once. Pipeline hazards were the only category not specifically mentioned in connection with priorities and needs.

Table 2.2: Priorities and Needs for Technological Hazards in PECO Countries

Topic Area	Priorities/Needs
Technological Hazards	
Technological Hazards, Generally	1. To implement a good emergency plan which covers prevention and response to all technological and natural hazards (BG) 2. To acquire proper equipment for responding to technological disasters (LV)
Hazardous Installations	3. To develop a good programme for industrial risk assessment and management (BG) 4. To implement training in Seveso II issues, including assessment of documentation, performing inspections, etc. (BG) 5. To implement a good programme of preparedness for and prevention of chemical accidents (LT) 6. To build expertise in risk assessment and evaluation methods for industrial hazards (LT) 7. To complete development of an information management system for managing industrial accident prevention and response (LT) 8. To acquire improved emergency detection and support systems for industrial hazards (LT) 9. To ratify the Convention on the Transboundary Effects of Industrial Accidents (PL) 10. To ensure that industrial hazards are properly taken into account in land-use planning, applying appropriate methodologies and criteria (SLO) 11. To improve the quality of inspections and accident reports required under Seveso II (SLO) 12. To reduce risk posed by hazardous establishments by introducing prevention, preparedness and response measures (H) 13. To develop an industrial accident information system (H) 14. To review existing emergency plans based on safety reports of Seveso establishments (H) 15. To develop existing research infrastructure for major industrial hazards (H)
Contaminated lands	16. To assess and clean up contaminated lands (BG) 17. To develop and apply assessment tools to make decisions involving contaminated lands, oil-shale mining, wastes and natural hazards (EST) 18. To obtain the necessary financial resources to address the problem of contaminated lands (LV) 19. To develop and apply appropriate methodologies for risk assessment of contaminated lands (LV) 20. To acquire necessary analytical equipment and technology for monitoring and analysing contaminated lands (LV)
Oil-shale Mining Waste	15. To develop and apply assessment tools to make decisions involving contaminated lands, oil-shale mining wastes and natural hazards (EST)
Pipelines	Not mentioned
Transport of Dangerous Goods	21. To prevent and limit accidents occurring through the transport of dangerous goods, especially road transport (BG) 22. To reduce risk posed by transportation of dangerous goods (H) 23. To develop risk assessment tools for the prevention of transport accidents (H)
Transboundary Pollution	24. To elaborate and implement measures to limit transboundary pollution (BG) 25. To obtain equipment for adequately monitoring pollution (LV) 26. To improve monitoring of the surface waters in Hungary and maintain good quality (H) 27. To implement the decisions of the Conference of the Parties for the UNECE Convention on the Transboundary Effects of Industrial Accidents (H)

Natural Hazards

Seven countries identified a specific need in relation to natural hazards, with four countries showing a general interest in improving either risk assessment or emergency management, or both, of natural hazards. The following points are of particular interest:

- The Slovak Republic and Romania each provided very specific details in regard flood priorities and needs. Slovakia has recently adopted anti-flood legislation and implementation of the legislation will be an important objective in the country for the next several years. As part of its national flood strategy, Romania is in the process of implementing a framework program for flood protection applying a basin approach and incorporating structural and non-structural measures for prevention, and improved communication and warning systems on the response side.

- Only Bulgaria and Romania mentioned specific needs pertaining to forest fires although forest fires are an important hazard in many countries.
- Earthquakes and landslides are a problem of medium to high relevance in only three countries, so it is not surprising that these hazards did not figure prominently in the total list of PECO country priorities and needs.

Table 2.3: Priorities and Needs for Natural Hazards in PECO Countries

Topic Area	Priorities/Needs
Natural Hazards	
Natural Hazards, Generally	1. To implement a good emergency plan which covers prevention and response to all technological and natural hazards (BG) 17. To develop and apply assessment tools to make decisions involving contaminated lands, oil-shale mining wastes and natural hazards (EST) 28. To acquire general knowledge about natural disaster preparedness and response (BG) 29. To prepare up-to-date assessments of threats from natural hazards (SLO)
Floods	30. To improve the flood prevention infrastructure (BG) 31. To improve the flood prevention infrastructure (CZ) 32. To improve the flood prevention infrastructure (RO) 33. To develop non-structural measures, e.g., improved legal and operational framework, for flood prevention and strategic intervention (RO) 34. To improve early warning capabilities for storms and floods (RO) 35. To implement the new anti-flood programme and associated flood control measures (SK) 36. To conduct research to support implementation of the new anti-flood programme (SK)
Forest Fires	37. To create good organisation measures to prevent and fight fires (BG) 38. To improve risk assessment techniques to better anticipate the occurrence of forest fires (RO)
Landslides	39. To implement improved landslide control measures (RO) 40. To complete field studies of landslide areas (RO)
Earthquakes	41. To identify communities and buildings that are critical in terms of emergency recovery and life safety in high risk seismic zones (RO) 42. To select facilities for seismic risk mitigation funded by national and international projects (RO)

Specific Priorities and Needs Classified according to Selected Types of Activities

Priorities and needs were also classified horizontally, according to the type of risk management activity that they belonged. The JRC selected major categories of activity of particular interest to JRC, as well as priorities and needs of a generic nature that could not otherwise be captured under the headings of "technological hazards" and "natural hazards". These categories were: risk assessment, information management, emergency preparedness, integrated risk assessment and management, monitoring and research. Not all of the items named by the PECO countries, and contained in Tables 2.2 and 2.3, could be classified within these categories and these were accordingly left out of Table 2.4.

Table 2.4: Priorities and Needs by Selected Types of Activities[a]
Management of Natural and Technological Hazards in PECO Countries

Topic Area	Priorities/Needs
Priorities and Needs Classified by Selected Types of Activities	
Risk Assessment	3. To develop a good programme for industrial risk assessment and management (BG) 6. To build expertise in risk assessment and evaluation methods for industrial hazards (LT) 17. To develop and apply assessment tools to make decisions involving contaminated lands, oil-shale mining wastes and natural hazards (EST) 19. To develop and apply appropriate methodologies for risk assessment of contaminated lands (LV) 23. To develop risk assessment tools for the prevention of transport accidents (H) 29. To prepare up-to-date assessments of threats from natural hazards (SLO) 38. To improve risk assessment techniques to better anticipate the occurrence of forest fires (RO) 41. To identify communities and buildings in high risk seismic zones (RO) 42. To apply appropriate methodologies for risk assessment (BG)
Information Management	7. To complete development of an information management system for managing industrial accident prevention and response (LT) 13. To develop an industrial accident information system (H) 43. To develop modern computer, information and communication tools for supporting rescue and crisis management (PL) 44. To review and revise the information management system for disaster emergencies (SL)
Emergency Preparedness	1. To implement a good emergency plan which covers prevention and response to all technological and natural hazards (BG) 2. To acquire proper equipment for responding to technological disasters (LV) 8. To acquire improved emergency detection and support systems for industrial hazards (LT) 14. To review existing emergency plans based on safety reports of Seveso establishments (H) 45. To prepare a co-ordinated Book of Rules for disaster management (H) 46. To develop an integral rescue and crisis management system in accordance with the National Calamities Act (PL) 47. To organise, train and equip emergency response teams in keeping with best practices (SLO)
Integrated Risk Assessment and Management	1. To implement a good emergency plan which covers prevention and response to all technological and natural hazards (BG) 47. To develop an integral rescue and crisis management system in accordance with the National Calamities Act (PL) 48. To improve the emergency decision-making system (SLO)
Monitoring	20. To acquire necessary analytical equipment and technology for monitoring and analysing contaminated lands (LV) 22. To improve monitoring of the surface waters in Hungary and maintain good quality (H) 25. To obtain equipment for adequately monitoring pollution (LV) 34. To improve early warning capabilities for storms and floods (RO)
Research	15. To develop existing research infrastructure for major industrial hazards (H) 36. To conduct research to support implementation of the new anti-flood programme (SK)

[a] This table does not include a complete list of all the priorities and needs, but only those that fall in the categories listed in the table.

The JRC noted the following points of interest from this compilation:

- Priorities and needs related to risk assessment and emergency preparedness (including equipment needs) were mentioned by at least half the countries.
- Three or more countries gave special attention to activities associated with information management, integrated risk assessment and management and monitoring.

Table 2.5: European, Inter-Regional and International Initiatives and Obligations

Hazard Type	Major Obligations and Initiatives
Hazardous Installations	▪ *EU Acquis Communautaire.* Council Directive 96/82/EC of 9 December 1996 on the control of major-accident hazards involving dangerous substances – The “Seveso II” Directive ▪ UNECE Convention on Transboundary Effects of Industrial Accidents ▪ OECD Working Group on Chemical Accidents ▪ Proposed as a risk targeted by the “Integrated EU Strategy on Prevention, Preparedness and Response to Natural, Man-Made and Other Risks” (currently under development within DG-Environment)
Pipelines	▪ Currently, there is no international agreement or European legislation that directly addresses pipeline safety
Oil-Shale Mining Waste	▪ *EU Acquis Communautaire.* Directive 91/689/EEC on hazardous waste
Soil Contamination	▪ United Nations Convention to Combat Desertification ▪ *EU Acquis Communautaire.* Directive 2000/60/EC establishing a framework for the Community action in the field of water policy (EU Water Framework Directive) ▪ A number of pieces of legislation related to water and air quality incorporate principles for protecting soil and groundwater ▪ Soil protection was also the subject of a 2002 Communication of the European Commission entitled, “Towards a Thematic Strategy for Soil Protection”
Transport of Dangerous Goods	▪ *EU Acquis Communautaire.* Council Directive 96/49/EC on the approximation of the laws of the Member States with regard to the transport of dangerous goods by rail ▪ *EU Acquis Communautaire.* Council Directive 94/55/EC of 21 November 1994 on the approximation of the laws of the Member States with regard to the transport of dangerous goods by road ▪ European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) ▪ Regulations governing the International Carriage of Dangerous Goods by Rail (RID) of the *Convention concerning International Carriage by Rail* of 9 May 1990 (COTIF) ▪ European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (Not yet in force)
Effects of Transboundary Pollution	▪ *EU Acquis Communautaire.* Directive 2000/60/EC establishing a framework for the Community action in the field of water policy (EU Water Framework Directive) ▪ Convention on the Protection and Sustainable Use of the Danube River ▪ Convention on the Protection of the Marine Environment of the Baltic Sea Area ▪ Convention on the International Commission for the Protection of the Oder ▪ Convention for the Protection of the Mediterranean Sea against Pollution (The Barcelona Convention) ▪ Decision of the European Parliament and of the Council of 20 December 2000 setting up a Community framework for co-operation in the field of accidental or deliberate marine pollution ▪ *EU Acquis Communautaire.* Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management (Air Quality Framework Directive) and daughter directives ▪ The UNECE Convention on Long-Range Transboundary Air Pollution
Natural Hazards	▪ Floods and forest fires are proposed as risks targeted by the “Integrated EU Strategy on Prevention, Preparedness and Response to Natural, Man-Made and Other Risks” (currently under development within DG-Environment) ▪ Council Decision of 23 October 2001 establishing a Community mechanism to facilitate reinforced co-operation in civil protection assistance interventions ▪ No specific European legislation or international agreements address specific natural hazards
Natural and Technological Disasters	▪ Open Partial Agreement on the Prevention of, Protection against, and Organisation of Relief in Major Natural and Technological Disasters (EUR-OPA Major Hazards Agreement) ▪ Cupertino Agreement on the Forecast, Prevention and Mitigation of Natural and Technological Disasters (Part of Central European Initiative) ▪ The Geneva Mandate On Disaster Reduction ▪ The UN International Strategy for Disaster Reduction. ▪ Several bilateral agreements between bordering countries guaranteeing mutual emergency assistance in the case of a disaster

2.2.3 Summary of External Forces Shaping PECO Country Priorities

For accession countries, important external drivers are the legal obligations associated with accession and other European, inter-regional and international conventions. The JRC's activity is strongly linked with external drivers, as accession to the European Union, with all the associated rights and obligation, represents one of the single most influential outside forces shaping the activities of PECO countries in the area of natural and technological risk management. Other multi-lateral and international agreements relevant to this area represent additional external forces. Moreover, these same external drivers have a strong influence over JRC's selection of priorities within this project. As Table 2.5 shows, the project could potentially contribute to the fulfilment of a number of objectives incorporated in various pan-European and multi-lateral initiatives.

Table 2.5 contains a list of major obligations and initiatives that affect some or all of the central and eastern European countries in relation to the hazards covered in this project. The Table includes Community legislation (i.e., binding elements of the *acquis communautaire)*, multi-lateral agreements at an international level and at an inter-regional level (between a few countries within a geographic region), and non-binding international and European initiatives. The list is not exhaustive but represents the most important influences on different countries and the region as a whole.

Technological Hazards

As the table shows, there is binding European legislation covering all but one of the technological hazards covered by this project. The obligation to meet the requirements of the *acquis communautaire*, particular the Seveso II Directive requirements, appears to be a key incentive in each country's decision to become involved in this project. Moreover, these hazards are also each the subject of framework conventions at the international level to which many of the candidate countries already belong. It should be mentioned that the *acquis communautaire* covers soil contamination through the Water Framework Directive. However, the obligation to restore the quality of degraded ground water does not come into effect for several years (until basin management plans are in place).

There appears to be no major international or European agreements or initiatives concerning pipeline safety. Legislation covering pipeline safety is generally not widespread in Europe as a whole. The Community itself does not have legislation covering pipeline safety although it was discussed extensively within the community institutions in the process leading to adoption of Seveso II. Three areas were identified as having major accident potential, but were not included in the Directive because of some inherent differences relative to risk management as opposed chemical installations, namely pipelines, ports and marshalling yards. Through this project, the JRC obtained some information on legislation in PECO countries that demonstrated that at least a few countries (Hungary, Romania, Slovenia) have national legislation addressing pipeline safety.

Natural Hazards

Contrary to technological hazards, there are virtually no binding international agreements or European legislation addressing risk management of natural hazards. Nonetheless, support for natural hazards reduction attracts considerable attention at the international level. The human and financial costs of major natural disasters have to some extent necessitated co-ordinated international involvement in this area. Several non-binding co-operation agreements and strategies have been developed as a result. Moreover, the EU also plays a co-ordinating role in disaster interventions through a Council Decision of 2001 and is currently finalising an integrated strategy for prevention, preparedness and response to natural, man-made and other risks.

2.3 CONCLUSIONS

The results of the risk relevance survey confirm the selection, demonstrating in almost all cases that the selected hazards are of high relevance to at least a few countries and moderately relevant for more than half. Among the ten hazards selected for the project, hazardous installations, transport of dangerous goods, transboundary pollution, floods and forest fires were most commonly perceived as of medium or high relevance to the PECO countries (eight out of ten, according to the Risk Relevance Survey). Contaminated lands and pipelines are of some significance in about half the countries. Other hazards, especially landslides and earthquakes, are of importance to only a limited number of countries (Bulgaria, Slovakia and Slovenia). However, in these countries, these risks are of such high concern (particularly, earthquakes) that any JRC effort to address natural risks in these countries must address them.

The overview of external driving forces offers further explanation, indicating above all where the requirements of the *acquis communautaire* have raised the importance of certain hazards among national authorities. It also indicates where international pressures may also be influencing the priorities of candidate countries, as the countries strive to become part of the developed world and seek additional support for the efforts through international mechanisms.

Chapter 3 Industrial Risks (Hazardous Installations)

3.1 BACKGROUND

It was determined at the March 2001 Seminar that management of risks associated with hazardous installations was a priority for all PECO countries because of the accession requirement to implement the Seveso II Directive, part of Chapter 22, "Environment" of the *acquis communautaire*. At the start of the project most of the PECO countries were in the process of transposing the Directive or had just completed transposition and were preparing for implementation.

The timing of the project was particularly fortunate. The JRC project arrived not too long before or after each country had begun to actively seek assistance and additional input for implementation. The PECO countries are aware that there is considerable knowledge on Seveso implementation available based on experience in the Member States. To gain access to that knowledge, some countries were engaged in their first PHARE twinning projects to support Seveso activities. Many had recently started participating in European-level and international meetings to co-ordinate activities of competent authorities in relation to international accident prevention and response.

3.1.1 The Seveso II Directive

Council Directive 96/82/EC, the so-called Seveso II Directive, was established in 1996 and entered into force on 3 February 1997. It replaced Directive 82/501/EEC (the "Seveso I" Directive). The aim of the Directive is to prevent major-accident hazards involving dangerous substances and, in addition, if such accidents do occur, to limit their consequences for man and the environment. Hazardous installations are covered under the Directive if there are one or more dangerous substances present on the site in quantities equal to or exceeding threshold quantities. Threshold quantities are established in the Directive to distinguish between upper-tier and lower-tier facilities, with upper-tier facilities considered to be a higher hazard than lower-tier facilities.

Under the Directive, Seveso-covered installations must submit a safety report (upper-tier installations) or a Major Accident Prevention Policy (lower-tier installations), which demonstrates that they have appropriately assessed the chemical accident risk present at the facility and there are adequate measures in place, including a safety management system, to control the risk. Competent authorities are required to enforce the Directive through a number of control measures, in particular evaluation and approval of safety reports and inspections. Competent authorities are also required to take the presence of Seveso installations into account in the land-use planning process and in external emergency plans. Reporting of major industrial accidents by competent authorities to the European Commission is a requirement of the Seveso II Directive and was also required under the original Seveso Directive (Council Directive 82/501/EEC).

3.1.2 JRC Support to the Seveso II Directive

The JRC's Major Accident Hazards Bureau (MAHB) provides technical support to DG-Environment and Member State competent authorities in implementation of the Directive within the European Union. Control of major industrial hazards is at the core of its research and technical exchange activities. The JRC has managed a number of technical working groups to create guidance documents for implementing certain aspects of the Directive (see http://mahbsrv.jrc.it/GuidanceDocs.html) It also has hosted a number of expert seminars to exchange experiences, best practices, and research findings relevant to major industrial hazard control (see http://mahbsrv.jrc.it/Proceedings.html). Furthermore, it participates in several shared-cost actions to develop implementation tools and further scientific knowledge in support of the Directive's implementation. As the repository for accident reports submitted to the Commission as required by the Directive, MAHB maintains the EU's database of major industrial accidents. (Accident "short reports" can be found at http://mahbsrv.jrc.it/mars/Default.html.) It also maintains the database on hazardous (Seveso) installations in the EU. (For more information, see http://mahbsrv.jrc.it/spirs/Default.html.)

Obtaining knowledge about best practices and gaining a greater understanding about the methodologies and tools available to support Seveso enforcement is particularly important to the development of implementation programmes in the eastern and central European countries. The Seveso II Directive represents an approach to industrial risk management that in many ways had no precedence in many of the PECO countries prior to the dissolution of the Soviet Union. In some cases responsibilities outlined within the Directive represent completely new activities for both the competent authority and the industry.

The project also represented an opportunity for the JRC to promote future co-ordination on practices and methodologies supporting Seveso activities within the European Union as a whole. Generally, the philosophies and methodologies to manage industrial risks in Candidate Countries are not yet fully entrenched, or even fully developed. As such a potential opportunity existed within the framework of this project to promote adoption of common approaches to Seveso implementation in these PECO countries, and in particular, to minimise the establishment of distinctly different methodologies and encourage best practices from one country to another.

3.2 Activities and Accomplishments

The industrial risk side of the project work plan aimed to achieve two principle objectives:

1. to offer immediate tangible value in the area of information management, risk assessment, and dissemination and adaptation of risk-based screening tools in support of each country's Seveso implementation activities, and
2. to gain information about industrial risk management in each country and establish a network of expert contacts to help identify and opportunities future opportunities for collaboration and technical exchange.

In achieving these objectives, the JRC hoped to begin building a lasting foundation for exchange of information and expertise between the JRC and the PECO countries, and also between PECO countries, in the management of industrial risks.

The JRC project focused firstly on information management and risk assessment, two activities that are very important support functions in the implementation of the Seveso II Directive. Article 6 of the Directive ("Notification") specifically requires the collection of Seveso plants data (data on the location of Seveso plants and the type and quantity of hazardous substances stored there). This information is of value to all levels of government, national, regional and local level, for fulfilling a number of requirements, including:

- preparation of external emergency plans (Article 11),
- implementation of the land-use planning requirement (Article 12),
- consultation of and providing information to the public (Articles 11 and 13)
- and planning the strategy for inspections (Article 18) and other national and regional planning efforts.

In the same way, risk assessment is fundamental to implementation of Seveso requirements, including those listed above, as well as the development of each lower-tier installation's major accident prevention policy, or the safety report and safety management systems of upper-tier installations.

Secondly, the JRC aimed to gain comprehensive information about the progress of implementation in PECO countries, specifically to help with targeting future technical support from the Commission, individual Member States and other sources. The information would also be useful in shaping expectations about implementation progress in the PECO countries and how long it might be before widespread improvement in industrial safety might actually be realised as a result. However, it was not intended that the JRC would use the information to pass judgment on the adequacy or appropriateness of each country's efforts. Such an objective was not viewed as a useful or appropriate outcome of the project.

The following is a detailed description of the activities and accomplishments of the project.

1. Dissemination of the MARS/SPIRS software tool to PECO Countries.

The JRC has developed and maintained a number of information management tools for implementing the Directive that could easily form the basis of a data and information management system that would meet the needs of PECO countries. In developing the project work plan, it was recognised that one or more of these tools could be made immediately available to PECO countries who participated in it. It was thought that offering such tools, complete with training, at an early point in the project would be beneficial in garnering a firm commitment to it from the various competent authorities. In other words, the JRC could offer a direct and tangible benefit to each country at the outset for its participation in the project.

During the March 2001 seminar it was agreed that the MARS/SPIRS software system offered an information management tool that could be a starting point for PECO countries in building their own systems. The Major Accident Reporting System (MARS) is a software tool for managing information on major accidents reported under Seveso II. It is the tool by which all Member States report industrial accidents to the Commission, in accordance with the Directive. The MARS accident database is managed by the JRC.

The SPIRS software tool is designed to establish an information management system for collecting, organising and analysing the data of major hazardous industrial establishments that fall under the provisions of the Seveso II Directive. The SPIRS software also allows these data to be associated with spatial information and the JRC has purchased a number of licenses that allows it to offer a limited number of maps with the software. Alternatively, the system also allows each users to add their own maps. The software also contains a risk-ranking tool that allows a simple prioritisation of installations according to risk characteristics.

The SPIRS software in particular was thought be helpful to PECO countries in the process of compiling an inventory of installations, with the possibility of also applying a risk screen to installations of potentially higher or lower priority. It was also considered that SPIRS could be expanded to include additional risk prioritisation or risk assessment tools if the opportunity or need arose over the course of the project. In addition, by making the SPIRS software available, the JRC hoped to encourage PECO countries to provide a listing of Seveso-covered installations in each country to the Commission for the Commission's SPIRS inventory of hazardous installations in Europe[13].

2. Training on MARS/SPIRS software

The JRC held training on-site in each of 9 PECO countries from September 2001 through March 2002. The JRC was unable to give training in Romania because the request arrived at a later stage of the project (fall 2002), and at this time resources of available staff were committed to preparations for the project seminar in November.

Most countries invited several representatives of different competent authorities, from both national and regional levels to the meeting, with an average of 9 in-country participants per meeting except for Hungary in which there were over 30 participants representing national authorities and disaster management organisations concerned.

This JRC SPIRS/MARS training was aimed to help each country understand the purpose and basic functions of the software well enough to use it for their own purposes. Participants were given background on the development of MARS/SPIRS and an explanation of the functions of the software with demonstrations. A portion of the programme was also dedicated to risk assessment, including an overview of basic principles and discussion of the types of approaches under consideration in the country for the Seveso II Directive. The meeting participants were also given an overview of Seveso II implementation support available through the Commission via the JRC.

As part of the meeting, each country was also asked to make a presentation on preparations for Seveso implementation in the country. This presentation was expected to cover deadlines for transposition and implementation requirements, training and technical support activities, the current state of hazardous installations data, and information systems available or in development that could support data and

[13] It has been agreed that this information would remain confidential among competent authorities and the Commission, and for reasons of security, it is not to be shared with external parties.

risk management functions. The presentation was followed by general discussions of the experience with Seveso thus far particularly problem areas or areas where additional technical support (e.g., from the JRC, Member States) would be useful. Sharing of each country's hazardous installations data with the JRC was also discussed. During these meetings, time was also allocated to learning about risk assessment needs related to natural and other technological hazards.

3. Collection of existing data and information relative to hazardous installations and Seveso II implementation in PECO countries.

As envisioned in the project proposal the JRC also sought information that would allow it to assess the existing capabilities and needs of each PECO country in relation to information and risk management. It also sought comprehensive information on each country's progress in transposing and implementing the Directive. Together these two areas of knowledge would form a basis for targeting future collaboration and exchanges relevant to the management of industrial risks. The JRC gathered this information through a questionnaire on the collection and management of hazardous installations data ("the SPIRS Survey") and through a systematic collection of information on Seveso II implementation in each country through documentation and through interactions via training meetings, seminars, and written correspondence.

The SPIRS Survey. This survey, distributed to and completed by all the PECO countries, allowed the JRC to acquire precise information about the availability and character of hazardous installations data collected in each country. It was aimed at determining how well the hazardous installations data in PECO countries could be adapted to SPIRS. This approach allowed the JRC to evaluate whether the data in each country were in a format compatible to the SPIRS software. Moreover, it allowed the JRC to form an idea of the completeness and accuracy of data available within the competent authorities, the level of detail that it contained, and whether hazardous installations had been electronically mapped. The JRC also included questions relating to the accessibility data to national competent authorities and for use in electronic form with mapping and data management software.

The survey also was intended to introduce the PECO competent authorities to the data requirements of SPIRS, as a consideration in implementing the data collection requirements of Seveso. Moreover, the JRC expected that survey answers would provide ideas for creating or adapting existing software tools for use in Seveso implementation in PECO countries. For example, the JRC was interested in exploring whether it might be useful to build additional data manipulation and analytical tools into or as possible add-ons to the SPIRS software.

The SPIRS survey consisted of two sections:

- A general section, requesting information about the accessibility, availability and quality of data pertaining to hazardous installations within PECO countries.
- A section on the data elements specific to SPIRS: plant location, type of industry, type of substance qualifying the plant as a Seveso installation, and quantity of the substance. The section asked questions as to how and whether these characteristics were identified in the database(s) of each country.

At the training workshops, and in follow-up communication, the JRC reviewed the survey responses with each PECO country to ensure completeness and accuracy of understanding.

Delivery of hazardous installations data to the JRC by several countries. Five countries provided the JRC with official or preliminary databases of hazardous installations in their country that were, or were expected to be, covered under the Seveso II Directive. The Czech Republic, Estonia, Latvia, Poland and Romania have all provided the JRC with a complete set of hazardous installations data (preliminary or official estimates) for input in the SPIRS database, which in total account for 691 out of over 1.000 Seveso installations in PECO countries.

Collection of Information on Seveso Implementation. The JRC recognised that information specific to hazardous installations was best absorbed and understood in the context of the overall progress and strategy of the country in Seveso implementation. Moreover, detailed information on the structure and organisation of Seveso implementation in each country was not readily available. It was appreciated that a general summary of progress, contact points and implementation strategies could be useful to future efforts of the JRC, DG-Environment and other Member States in working jointly on Seveso initiatives with the PECO Countries.

Therefore, information gathering in the work plan was extended to cover general Seveso implementation. The JRC systematically collected implementation information that would allow it to create a profile of each country's Seveso implementation strategy and schedule. Using a template of questions about key implementation activities under Seveso, the JRC collected information through documentation supplied by different countries, through presentations at project seminars and training workshops, as well as dedicated interviews and correspondence with project focal points in each country[14].

4. Collaboration on Applied Research and Tools for Risk Assessment of Hazardous Installations

The JRC also explored the possibility of collaborating on risk assessment projects with PECO countries in the context of Seveso implementation. It was envisioned that these projects could be research-based or aim at the further development of risk assessment tools, particularly in relation to the SPIRS software. These kinds of projects were viewed as mutually beneficially to the JRC and the PECO countries in that they supported PECO country efforts to build expertise in Seveso risk assessment and they could contribute to the knowledge and tool-base applied to Seveso risk-assessment in future.

As a result of these efforts, the JRC launched projects with both Poland and Slovenia in regard to risk assessment for hazardous installations.

- Poland. During the SPIRS/MARS training meeting in Warsaw, Poland presented a software tool it had developed for applying the IAEA risk assessment methodology. This presentation led the JRC to contract with

[14] A SPIRS/MARS training workshop did not take place in Romania. However, Romania answered questions through personal correspondence and was generally very helpful in providing precise documentation and presentations as requested.

Poland in 2002 to translate the software into English and integrate it into the SPIRS software tool. It is expected that the product will be ready to be tested sometime early to mid-2003.

- Slovenia. Slovenia also expressed interest in working with the JRC on a risk assessment pilot project in Slovenia in order to gain experience in applied risk assessment and to develop a recommended approach or approaches to its industry. The resulting project was designed as a benchmarking project, in which different risk assessment tools are applied to a number of different hazardous installations and the results are compared. The project is expected to be completed in early 2003.

3.3 Project Findings: Seveso Implementation and Information Management

The purpose of gathering information on Seveso implementation, technical support activities, and data and information systems was to help target future efforts of the Commission, and especially the JRC, to support Seveso implementation in PECO countries. It was thought that this information could also assist the candidate countries themselves in gaining attention within their national governments and the EU to specific problem areas and directing resources accordingly. A secondary goal was to obtain a snapshot of progress in Seveso implementation that could be helpful in evaluating the practical outcome of implementing this portion of the *acquis*, highlighting obstacles and advantages in various countries, and in shaping expectations about when effective implementation will really occur within the region.

An important finding concerned the various different ways in which each country was preparing for Seveso implementation. This diversity was largely a function of the structure, functions and expertise within existing institutions in each country. The inherent structure in turn determined the pace of each country's implementation, and also strengths and weaknesses that would have to be taken into consideration in organising and prioritising training and technical support activities. As a consequence, all the countries appeared to be at very different stages in the collection and management of hazardous installations data, in developing and using information management systems for Seveso, and in choosing a risk assessment approach and developing appropriate expertise. It soon became clear that the JRC would require substantial knowledge about all these areas of implementation in order to cultivate working relationships and identify possible collaborations with each country of mutual benefit and interest.

In some countries, the competent authorities were still struggling with how the components of implementation would all fit together. A good number did not have much experience with industrial risk assessment and struggled with the responsibility of recommending the right approach and then building the expertise to implement it. For these reasons above all, the exchanges with the JRC were warmly welcomed. The JRC staff were viewed as sounding boards and as opportunities to obtain ideas and access to more information about Seveso implementation. In turn, the countries were quite open with the JRC in talking about their progress in implementing Seveso, particular problems, and areas where JRC experience and expertise, as well as that of the Member States, could help. The co-operation and enthusiasm of the PECO countries in this area, as in all areas of this project, was exceptional.

3.3.1 Seveso Hazard Profile

According to the estimates we received from each country, 1.104 installations qualify for coverage under the Seveso II Directive in eastern and central European countries (see Figure 3.1). Of these, 498 qualify as upper-tier and 606 as lower-tier. Poland has the largest number of installations (285), followed by Romania (202). Poland and Romania also have the most upper-tier establishments (120 and 132, respectively). Slovenia, Estonia, and Lithuania and have the smallest number of facilities (34, 28 and 26 respectively).

The eight PECO countries due to accede to the Union in 2004 are estimated to have 835 Seveso installations, and of these 331 qualify as upper-tier and 504 as lower-tier.

Five countries have also contributed to the SPIRS database of hazardous installations that JRC maintains on behalf of the Commission. (For security reasons, these data are confidential and not available to the public.) As mentioned previously, the Czech Republic, Estonia, Latvia, Poland and Romania have all provided the JRC with hazardous installations data (preliminary or official estimates) for input in the SPIRS database, which in total account for 691 Seveso installations in PECO countries. At a minimum these data include the geo-referenced location or the physical address of each installation and, in many cases, the type and quantity of the qualifying substance or substances. These data are discussed later in this section

Table 3.1 (next page) shows that the distribution of installations within countries is not uniform relative to population, population density or land area in each country. The table does not aim to make any conclusions about the difference in exposure of the population and environment to risk from hazardous installations. This table is only intended to show that there are vast differences in the area and population density of each country which, may influence related risk

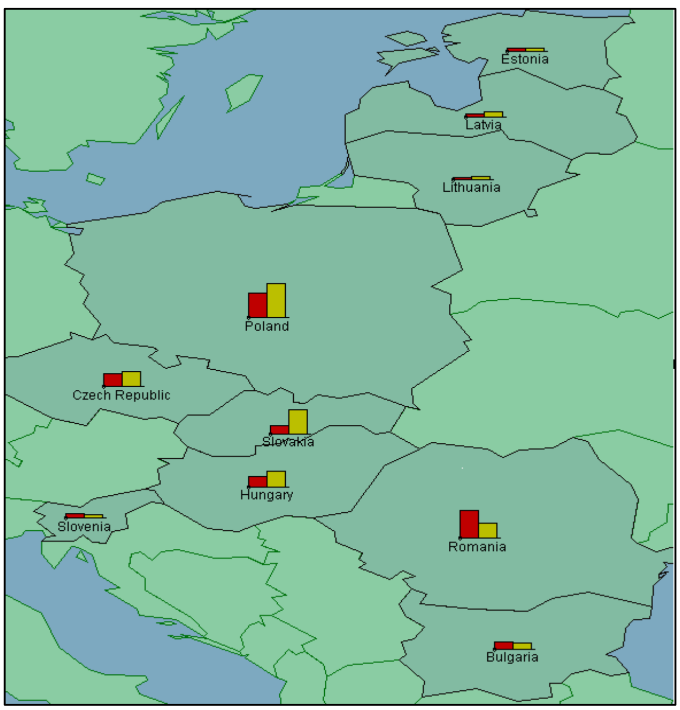

Figure 3.1: Distribution of Seveso Installations in PECO Countries December 2002

	Total	UpperT	LowerT
Bulgaria	67	35	32
Czech Rep	132	62	70
Estonia	28	13	15
Hungary	126	50	76
Latvia	44	16	28
Lithuania	26	11	15
Poland	285	120	165
Romania	202	132	70
Slovak Rep	160	40	120
Slovenia	34	19	15

Table 3.1: Installations in PECO Countries vs. Area and Population December 2002

	Total Seveso Installations	Total Country Population (000's)	Total Country Area (km^2)	Population Density (inhab/km^2)
Poland	285	38.654	312.685	123
Romania	202	22.400	238.391	94
Slovak Rep	160	5.400	49.035	108
Czech Rep	132	10.300	78.866	131
Hungary	126	10.200	93.036	108
Bulgaria	67	8.000	110.993	72
Latvia	44	2.370	64.589	37
Slovenia	34	1.932	20.273	95
Estonia	28	1.370	45.227	30
Lithuania	26	3.700	65.300	57

management decisions, particularly when the numbers are further translated to the local or regional level.

3.3.2 Implementation

By the end of the project, all the countries had committed resources and taken serious steps towards implementing the Directive. As shown in Table 3.2, the Czech Republic, Hungary, Latvia and Poland had already transposed the Directive before the project started. Four countries, Bulgaria, Estonia, Lithuania and Romania, had not yet completed transposition of the Directive at the project's end. However, transposition was expected to be achieved prior to accession.

In addition, preparation activities were well underway in all the countries. Most countries were already in the process of conducting awareness seminars for competent authorities and industry. Several countries also had already re-organised or added staff in the competent authorities to enable them to better meet the Directive requirements, or were seriously contemplating these options.

Time frame for Transposition and Fulfilling Core Requirements

Table 3.2 (next page) identifies three important milestones in Seveso implementation, transposition of the Directive through enabling legislation, followed by submission of notifications, and then submission of Major Accident Prevention Policies (MAPPs) (lower-tier sites) and safety reports (upper-tier sites). Schedules within the different countries to reach these milestones are generally as follows:

- As indicated in the table, the Czech Republic was well ahead of the other nine countries in Seveso transposition and in requiring submittal of notifications in 1999.
- Hungary, Latvia, and Poland all achieved transposition in 2001 and 2002. Slovenia and Slovakia both completed transposition by year-end 2002, and Estonia is not far behind.

Table 3.2: Status of Transposition and Deadlines for Notifications and Safety Reports

	1999/2000	2001	2002	2003	After 2003*
Transposition Signed	CZ	H, LV, PL	SLO, SK	BG, EST[b], LT, RO[b]	
Notification (Art. 6) – Submission Deadline	CZ		LV, H, EST, PL, SLO	BG[a], LT[a], RO[a], SK	
Safety Reports (Art. 9)[c, d] – Submission Deadline			CZ, H	LV, PL	BG, EST, LT, RO, SK, SLO

[a] Expected, not official

[b] In some countries transposition of the Directive occurs in stages, so that the notification requirement is transposed and implemented prior to full transposition of the Directive. Generally, the majority of transposition will have occurred prior to the notification deadline because of the need to have an organisational structure and implementation guidance in place for receiving and processing notifications.

[c] For existing facilities

[d] The Major Accident Prevention Policy required by lower-tier facilities was due at the same time as the safety report in most (but not all) countries.

- These countries, along with possibly Bulgaria, all plan to have received notifications by year-end 2003.

The JRC also observed that the lag period between the notification deadline and the MAPP/safety report deadline was longer in some countries than in others. Most countries chose to receive notifications well before safety reports (at least a year or so), except for Hungary which scheduled deadlines for both these items in the same year (2002). Notifications provide greater certainty as to the extent of Seveso responsibilities within industry and the competent authorities, and perhaps some countries felt an extended period was needed once the extent of Seveso coverage was concretely known.

Implementation of other key activities

For the purposes of comparing implementation progress, the JRC also identified the following key responsibilities of competent authorities in Seveso implementation:

- Completion of external emergency plans, incorporating measures to address risks presented by major industrial hazards (Article 11).
- Development and execution of an inspection plan, to enforce Seveso requirements at covered installations (Article 18).
- Development and execution of a land-use planning strategy, that aims at maintaining appropriate distances between hazardous installations and the surrounding population and the environment (Article 12).
- Development and execution of a strategy for providing information to the public, on safety measures to be taken in the case of emergencies, as well as

Table 3.3. Due Date for Completing of External Emergency Plans

	1999/2000	2001	2002	2003-2005	Not fixed
External Emergency Plans – Deadline for Completion			CZ, H	EST, LT, LV, PL, RO, SK, SLO	BG

Table 3.4. Status of Implementation of Inspection, Land-Use Planning and Public Information Requirements Year-End 2002

Status / Activity	Strategy [a] developed	Strategy not fully developed [a]	Training/ guidance is in progress.	Training/ guidance completed	Implementa-tion started
Inspections	CZ, H, LV[b]	BG, EST, LT, PL, RO, SK, SLO	EST, H, LV, PL, SLO	CZ, H	(Inspections started) CZ, H
Land-Use Planning	CZ, H, LV[b], PL, SLO	BG, EST[b], LT, RO, SK	Little or no information		See note (c) CZ, H, PL
Information to the Public	CZ, H, LV[b], PL, RO, SLO	BG, EST, LT, SK	Little or no information		See note (c) CZ, H, PL

[a] A complete strategy should include the establishment of administrative and technical procedures, except for inspections. For inspections, a complete initial strategy should also include the establishment of an inspection schedule.

[b] The information from this country was not entirely clear, but based on indirect evidence, it seems probable that this country met these criteria by year-end 2002.

[c] The starting date of implementation is difficult to define for the land-use planning and public information requirements of the Directive. It is assumed, however, that these requirements become enforceable once a MAPP or safety report has been officially accepted. The table indicates that, under this assumption, implementation in the Czech Republic, Hungary and Poland, may have commenced. However, there are question marks because MAPPs and safety reports had not yet been submitted in most countries, or in countries who have received this documentation, only a portion so far (if any) have been officially pronounced as complete and satisfactory by the authorities in these countries by the end of 2002.

providing public access to safety reports and other relevant information (Article 13).

Table 3.2 (previous page) and Tables 3.3 and 3.4 show PECO countries following a pattern of activity towards full implementation, more or less similar to that which occurred in many Member States prior to full implementation. This finding is not surprising, given that this pattern of progression is based on the logical progression of activities implied in the Seveso II Directive. The focus of initial preparation and technical support activities is almost always the notification and safety report requirements, because in large part, the content of these documents controls or directs the implementation of other Seveso requirements.

The deadline for completing external emergency plans and inspection plans follow submission of the safety report, because once the MAPPs and safety reports have been submitted, the competent authorities are equipped with the information to execute strategies addressing these requirements. Preparations for implementation of land-use planning and public information requirements usually, but not always, are completed in the final stages before full implementation is achieved.

Table 3.3 (previous page) shows that nearly all countries will have completed emergency plans by 2005. (Slovakia is the last with a deadline of June 2005 and Bulgaria's plans in this regard are not known). As noted in Table 3.4 (previous page), only half the countries appear to have finalised their overall strategy towards implementing inspections, and to this end, some countries are undertaking specific actions to develop their technical approach (gathering information and preparing guidance), notably Estonia and Slovenia.

Similarly, at least half the countries appeared to have established a strategy for land-use planning by the end of 2002. Land-use planning requirements will come into play earliest for the Czech Republic, Hungary, Latvia and Poland because they have safety report deadlines in advance of the other countries. On the other hand, a number of pressures have made land-use planning a current priority in Slovenia. Hence, Slovenia has already developed a strategy for addressing Seveso issues in this area for incorporation into new legislation on land-use planning passed in November 2002.

At least five countries have finalised an initial strategy for providing information to the public.

Related Activities at the European and International Level

The JRC noted that several countries began participating regularly in European and international activities for industrial hazard control as they came closer to finalising transposition legislation. After transposition occurs in one country, the JRC has also observed an additional increase in involvement of that country in EU research and technical projects. These activities and country participation are listed in Table 3.5 (next page).

Participation in Meetings of the CCA. The Committee of the Competent Authorities for Implementation of the Seveso II Directive (CCA) is a statutory committee established under Article 22 of the Directive, composed of representatives of the Member States and chaired by the Commission. The Candidate Countries have been invited to participate in the semi-annual CCA meetings since the first meeting was convened following the mandatory application of the Directive in 1999. Eight currently participate in the CCA meeting, of which six (Czech Republic, Estonia, Hungary, Latvia and Poland) have been participating since 1999.

Participation in the UNECE TEIA and the OECD Working Group on Chemical Accidents). Six countries are Parties to the UNECE TEIA (Convention on Transboundary Effects of Industrial Accidents). The Convention has met twice since it entered into force in April 2000. It provides an additional mechanism for accession countries to co-operate on research and development and to share technology and best practices for implementation.

OECD Chemical Accidents Working Group. Four PECO countries (Czech Republic, Hungary, Poland and Slovakia) are members of the OECD and participate more or less regularly in formal working group meetings and targeted activities. Other countries are also able to participate as observers but so far participation has been

Table 3.5: Participation in International or EU Activities in Support of Seveso II

Activity	# of countries
INTL - Parties to UNECE TEIA (Convention on Transboundary Effects of Industrial Accidents)	BG, CZ, EST, H, LT, SLO
INTL – OECD Working Group on Chemical Accidents	CZ, H, PL, SK[a]
EU - Participation in CCA semi-annual meetings (Committee of the Competent Authorities for Implementation of Seveso II)	CZ, EST, H, LV, LT, PL, SK, SLO
EU – Participation in CCA Land-Use Planning Technical Work Group	CZ, SLO
EU – Mutual Joint Visit Programme on Inspections under Seveso II	EST, H, LV, SLO
EU – Research institute based in the country is a partner in EU research (shared-cost action) in support of major hazard control.	CZ, PL, SLO
EU – Country participates in the project review panel for a shared-cost action for major hazard control.	CZ, H, SLO

[a] Only these four PECO countries are actual members of OECD

minimal in the last few years. (Slovenia participated in one working group meeting in 1999.)

Participation in EU Technical Work Groups EU Shared-Cost Actions. The European Commission, through the combined efforts of the JRC, DG-RTD and DG-Environment, has an ongoing programme of technical support for implementation of the Seveso II Directive. Typical actions within this framework include technical working groups to help develop guidance and tools for implementing a specific aspect of Seveso II; expert workshops for exchanging technical information; and research projects funded as shared-cost actions. Table 3.5 notes that some PECO countries have recently become more involved in some of these technical support activities, including the Technical Working Group on Land-Use Planning, the Mutual Joint Visit on Inspections Programme, and as participants in shared-cost actions, as full partners or as members of a project review committee.

Bi-Lateral and Multi-Lateral Information Exchanges and Technical Collaborations Between Countries. Exchanges between PECO countries on Seveso matters seemed to take place more often in the international and European forums mentioned above. Nonetheless, within various regional networks countries, such as the Baltic Environment Forum, the Visegrad Four[15], and the Bercen Network[16], information has been exchanged on this topic, and workshops dedicated to Seveso have been organised. These exchanges may occur even more frequently as Seveso implementation matures in the region.

3.3.3 Technical Support Activities

The JRC aimed to understand the status of key technical support functions for implementation of the Directive, with a particular focus on expertise in risk assessment and evaluation of safety report requirements. Based on information gathered in these countries, the JRC observed that a number of technical support activities were underway. Notably, some countries were able to gain access to

[15] The Czech Republic, Slovakia, Hungary and Poland
[16] Balkan Environmental Regulatory Compliance and Enforcement Network

Member State expertise through Phare Twinning projects, and this interaction is discussed briefly in the first part of this section. Moreover, allocation of resources for technical support appeared logical for countries that are in the early stages of transposition or implementation. The bulk of resources seem to be devoted to either general awareness and understanding of the Directive (aimed at both competent authority and industry audiences) or building expertise in risk assessment and evaluation of safety reports. There was also some mention of technical support for other key implementation activities, such as the development of external emergency plans and inspections. What the JRC learned of these other efforts is also summarised in this section.

PHARE Twinning Projects

Eight out of ten countries reported participating in one or more Phare Twinning projects. (Only Lithuania and Latvia had not yet been involved in any Phare projects for Seveso II implementation by the end of 2002.) Twinning is a mechanism under the PHARE programme in which Member States' expertise is made available to the Candidate Countries, through the long-term secondment of civil servants and accompanying expert missions, in order to support them in their efforts to adopt, implement and enforce key areas of the *acquis*. Each country made awareness a priority objective in their first PHARE project (some are now engaged in a second PHARE project). Other tasks accomplished through PHARE included establishment of a preliminary inventory of Seveso sites, development of an implementation plan, and training of competent authorities, and often industry as well, in developing and reviewing safety reports and industrial risk assessments.

Member States mentioned as co-participants in Twinning projects included Austria, Denmark, France, Germany, Ireland and the Netherlands.

Technical Support to Risk Assessment and the Safety Report Process

The Seveso Directive requires both competent authorities and affected industries to have a high competence in a number of areas. In particular, expertise in risk assessment and fulfilling safety report requirements is important for overall implementation of the Directive, and specifically Article 7 (MAPP), Article 9 (Safety reports), Article 8 (Domino Effects), Article 11 (Emergency Plans), Article 12 (Land-Use Planning), Article 18 (Inspections). The JRC, therefore, explored the progress of the countries in building competency within these two areas.

Table 3.6: Relevance of Risk Assessment and Safety Report Expertise to Seveso Implementation

Risk assessment	**Competent authorities –** Used to provide guidance in accepted approaches to risk assessment, review of safety reports, evaluation of domino effects, determining land-use policy. **Industry -** Used to assess risk in installations and as a base for measures, including the safety management system, detailed in the safety report.
Development/Evaluation of safety reports	**Competent authorities** – must review and evaluate safety reports. Used as a tool for inspections. **Industry** – must create safety reports, which include description of the risk assessment, safety management systems, internal emergency plan and other features.

The competent authorities in all the countries recognised that a solid understanding of the principles of industrial risk assessment and safety management is essential to effective Seveso implementation (see Table 3.6). The risk assessment is a fundamental component of the safety report by each upper-tier installation, and, to a lesser extent, the MAPP (prepared by lower-tier plants) in compliance with Articles 9 and 7 of the Directive, respectively. Within the safety report, in particular, the installation must be able to appropriately describe the results of the risk assessment, that is, the assessment of the chemical hazard, the likelihood of an event and its potential consequences. Then the safety report must link the risk assessment with an appropriate safety management system and internal emergency plan. For their part

Table 3.7: Risk Assessment and Seveso Hazards in PECO Countries

RA method explicitly specified in the legislation
Hungary Poland Slovak Republic
RA method recommended (in Guidance document)
Czech Republic
Romania
RA method in the process of definition
Bulgaria Slovenia
Latvia
Estonia

the competent authorities must have equal skills in risk assessment in order to evaluate the adequacy and appropriateness of the report and to apply the results to other Seveso enforcement activities, such as external emergency plans, land-use planning and inspections.

In some countries, risk assessment and the adoption of a particular risk assessment approach is specifically included in the legislation of three countries, and of these, both Hungary and Poland explicitly identify a probabilistic approach. Two other countries have described recommended risk assessment methods within guidance documents (see Table 3.7, previous page). In countries that have not mandated an approach by legislation or recommendation a solid understanding of industrial risk assessment is nonetheless extremely important. In truth, their level of knowledge may need to be even greater if they are planning to consider a variety of approaches as acceptable.

Therefore, the PECO countries all have devoted, or plan to devote, significant resources to develop these core competencies of risk assessment and safety report preparation/evaluation within industry and the authorities. (It is understood that this expertise would naturally also qualify for the preparation and review of MAPPs.) In researching implementation progress in these countries, the JRC noted that they all tended to follow a particular pattern of progression. Using this pattern, the JRC developed a simple hierarchy of activities, divided into three stages, by which it could roughly determine the status of each country's efforts in building expertise in risk assessment and development of safety reports.

Table 3.8: Status of Technical Support for Risk Assessment and Safety Reports

Year-End	**2002**	**2003**	**After 2003***
Stage 1: Awareness seminars for competent authorities and industry	BG, EST, LT, RO, SK, SLO		
Stage 2: Development of case studies and pilot projects.		BG, EST, LT, RO, SK, SLO	
Stage 3: Completion of guidance documents technical courses and series of seminars for competent authorities and industry. Safety reports due.	CZ, PL, H, LV		BG, EST, LT, RO, SK, SLO

Stages in Applying Risk Assessment Expertise for Seveso Implementation in PECO Countries

As shown in Table 3.8 (previous page), the completion of the third stage is always expected to occur slightly before the deadline when safety reports are due. As the table above shows, the PECO countries are roughly divided in two categories of advancement, with Czech Republic, Hungary, Latvia and Poland at the highest stage (guidance and training), having deadlines for safety reports in 2002 or early 2003. Of the remaining countries, the deadline for submitting safety reports will occur in 2004 or later, and not surprisingly, these countries have only just completed the first stage (awareness) in building expertise.

The JRC noted that some countries faced particular challenges relative to acquiring knowledge and expertise for applying risk assessment methodologies to Seveso installations. These challenges were considered two-fold, that is, one being a general lack of expertise within the country as a whole, and the other being a lack of expertise within industry. These two different aspects of this problem are described in the following paragraphs in more detail.

<u>Low Availability of Relevant Expertise in the Country as a Whole</u>. Most countries indicated that building competency in industrial risk assessment and in evaluation of safety reports was a big challenge, requiring significant resources over several years. In general, the concept of the safety management system, as defined in Annex III of the Directive, was little known and applied in most of central and eastern Europe in the past. Some countries clearly stated to the JRC that they completely lacked this expertise in both national competent authorities and research institutes. In other countries, the expertise available consisted of one or two persons in the entire country.

In particular, Poland and the Czech Republic appear to have a firm core of expertise in risk assessment, developed prior to Seveso implementation, in research facilities already established in the field of industrial safety. These countries are currently drawing on such foundations to build competency in this area within the national authorities. However, the authorities did not express high confidence concerning the breadth and depth of experience available in industry. On the other hand, Hungary appears to have some depth of expertise in its industrial sector, and this expertise is supporting the efforts of national authorities to build their own competency in this field as well as to extend such knowledge more broadly throughout industry.

Several other countries have risk assessment expertise in the nuclear field (notably Lithuania, Slovenia) but up until recently there is little experience in these countries in applying this expertise to industrial risks. These countries are in the process of converting this expertise so that it can be applied to hazardous installations. For example, in 2003 a Slovenian research institute, under the direction of the Ministry of Environment and Spatial Planning, is collaborating with the JRC to conduct a number of case studies. It is expected that these case studies will allow the authorities to benchmark the effectiveness of different risk assessment approaches in different installations. At the same time the project will help strengthen the ability of both national authorities and certain industry partners in conducting industrial risk assessments.

For some countries, therefore, the development of risk assessment and safety management aspects of Seveso implementation, as well as the training of staff, depended in part on assistance from sources external to the country. This factor has had a slowing effect on the progress of certain countries towards Seveso implementation, largely resulting from either funding limitations or difficulty in identifying appropriate outside experts.

Lack of Risk Assessment/Safety Management Systems Experience in Industry. Few countries were optimistic about the quality of safety reports that would be submitted by industry in the first instance. Several were very pessimistic about the existing level of expertise in industry regarding risk assessment and safety management systems. This sentiment was clearly expressed by at least five countries (Bulgaria, Estonia, Slovakia, Slovenia, and Lithuania). Also, the Czech Republic reported its initial experience in reviewing official or preliminary drafts and indicated that the quality was far from adequate in many cases. (However, it should be noted that this first-time experience may or may not be very different from that of Member States following transposition of Seveso II in the EU. One would need more information to evaluate whether deficiencies in the initial set of safety reports received by the Czech Republic, or for that matter, by any other candidate country, were, in reality, any more or less than that of the initial set of reports received by Member States.)

Some countries noted that new environmental requirements adopted to fulfil the *acquis communautaire*, such as Seveso II, had caused some chemical plants to go out of business in the last few years. In a preliminary assessment of Seveso resources in the year 2000, a report produced by the Latvian authorities estimated that many installations would need to make significant investments in the purchasing of monitoring equipment, safety equipment and alarm systems in order to comply with Seveso. Latvia subsequently reported that a portion of these establishments subsequently did indeed go out of business in 2001 and 2002, and environmental requirements were suspected, and perhaps even known, to be the cause or partial cause of their demise.

Estonia mentioned that the exclusive use of the Russian language in some parts of the country created an additional barrier to building expertise and understanding of the safety requirements of the Directive. Estonia noted that no official interpretation of the Seveso requirements exists in the Russian language.

Building Risk Assessment Expertise in Industry. It should be noted that efforts of Candidate Countries to build competency in this area are mainly directed at building necessary expertise within competent authorities. The competent authorities are generally not in a position to provide training to industry in risk assessment and development of safety reports. However, having the competence available within industry is an essential requirement for effective implementation, and to some extent, the countries view industry competency in meeting safety report requirements as one measure of the level of overall success of the Seveso programme. Therefore, all competent authorities have devoted some resources to support industry efforts to gain this expertise and some guidance and training activities are planned for industry along with activities to train competent authority staff.

In particular, most countries have taken, or will eventually take, responsibility for shaping industry expectations about compliance with safety report requirements through awareness training and guidance for industry. Moreover, many have facilitated technical exchange and joint projects between industry and the competent authorities to foster mutual learning between competent authorities and industry, particularly in risk assessment. In addition to raising the knowledge base, it is also hoped that such joint actions will also foster some agreement on common approaches between the two parties.

Technical Support to Other Key Seveso Activities

For other key implementation activities, guidance and training were underway in several countries by the end of 2002 for drawing up external emergency plans and conducting inspections according to Seveso requirements. Few details were available in regard to technical support for land-use planning and information to the public, largely because these activities do not normally enter very much into play in the early stages of Seveso implementation.

For external emergency plans, the JRC noted that at least seven of the countries had completed development, or were nearing completion, of their guidance for competent authorities in developing and implementing plans in accordance with Article 11 of the Directive (see Table 3.9). The competent authorities are already required to have local or regional emergency plans in all the PECO countries and therefore, the Seveso Directive requirements are additional to the existing plans. Specific examples of

Table 3.9: Status of Training Efforts for Key Implementation Activities[a] Year-End 2002

Activity	Guidance and training underway or already completed	Plans for training and guidance are still in development
External emergency plans	CZ, EST, H, LT, LV, PL, SLO	BG, RO, SK
Inspections	CZ, EST, H, LV, PL, SLO	BG, LT, RO, SK
Land-use planning	Little or no information	
Information to the public	Little or no information	

[a] Excluding risk assessment and safety report requirements

technical support include the development of guidance in the Czech Republic and Latvia, and training exercises for local emergency services such as those underway in Estonia.

Most countries that had begun guidance and training in emergency plans by year-end 2002 had also taken measures to provide technical support to inspections. Training and development for Seveso inspections is generally planned well in advance, even though implementation of inspections often is not in place until safety reports have been submitted and accepted by the authorities. Incorporating appropriate expertise and best practices may require significant time and resources, regardless of whether it is an existing or newly formed inspection programme. As it was for most Member States, safety management and documentation requirements of the Directive represent a complete new layer of activities for the candidate countries to monitor and enforce.

As noted previously, several countries have begun participating in the Commission's Mutual Joint Visit Programme on Inspections under Seveso II. The programme, established in 1999, consists of two or three workshops a year, hosted by different Member States, in which Seveso inspectors are gathered to share experiences and exchange information on best practices. Hungary, Latvia, Slovenia and Estonia have all participated in this programme over the last few years.

Several countries have held or are beginning to hold training sessions for inspectors. Poland has made inspections training a principal objective of its current PHARE Twinning project with Austria and France. This training will include training in risk assessment, a methodology for reviewing risk assessments and safety reports and inspections methodology, specifically tailored to inspectors.

3.3.4 Institutional Structure

The JRC also gathered information concerning the allocation of key Seveso responsibilities among the competent authorities within each country. The JRC was especially interested in organisational knowledge that might help it to work more effectively with PECO countries in technical support activities. Through this exploration, the JRC was able to gain some knowledge about what expert resources are already available in each country for certain activities, the volume of staff that may need specialist training, the distribution of staff in terms of experience and geographic area, and the level of co-ordination between ministries, offices or regions that might be required.

Adaptation of Seveso to Pre-Existing Enforcement Structures and Pre-Existing Competencies

As with the Member States, the PECO countries have mostly worked towards incorporating Seveso implementation into the existing institutional structure. There are exceptions, for example, Romania is creating a new Risk Directorate within the Ministry of Environment and Waters. However, in most countries, new organisations and substantial re-organisations are not foreseen initially, beyond the creation of a new specialist subsection of an existing specialist division. For some requirements, the choice of responsible institution or institutions is always clear, e.g., preparation of external emergency plans by civil protection authorities.

However, there are some requirements that do not adapt themselves as easily to existing structures. On of those areas appears to be: general co-ordination of Seveso implementation, because Seveso enforcement often does not fall cleanly within the traditional competencies of environmental protection, civil protection or occupational safety. Two other difficult areas appear to be the evaluation of safety reports and conduct of inspections, because competency in industrial risk assessment and safety management systems was not previously required and is therefore not widespread.

The JRC gathered information on the institutional arrangements envisioned by each country for implementation of the Directive. The results of its inquiries are shown in Table 3.10 (next page). In comparing the approaches in different countries, the JRC noted the following organisational characteristics that might be useful to consider in shaping training and technical support activities for Seveso in PECO countries.

Shared competencies. In many cases, the responsibility for a particular requirement is shared between more than one authority, often because more than one institution can claim competency or partial competency in the area. For example, in the PECO countries, responsibility for inspections and for developing external emergency plans were often shared by various authorities, including civil protection, environment and local administrative officials. Shared competency implies the need for good co-ordination and a shared approach to Seveso II enforcement, including the criteria and methodology applied in carrying out specific activities.

National co-ordination versus local co-ordination. Due to their nature, some Seveso enforcement responsibilities in regard to external emergency plans, land-use planning, and information to the public, require strong input from and are executed in large part by local or regional authorities. These authorities can either be municipal or district authorities responsible for general administration, or regional offices of the civil protection or environmental authorities. In addition, inspections are often divided among regional offices so competency and execution of inspection responsibilities are largely de-centralised. Moreover, in some countries, other enforcement activities are subject to a heavy degree of local or regional input.

Review of safety reports. The involvement of a central technical authority in this activity in several countries may give these countries an advantage in creating a core expertise in this area within the competent authorities. A greater concern is the burden placed on expertise within the competent authorities because of lack of expertise in risk assessment and safety management systems in the industrial sector. In a few countries, the number of authorities with a role in the review process is considerable, and may present a challenge in terms of co-ordination and consistency.

Inspections. Inspections is another area in which pre-existing competency in safety management under Seveso is not widespread. As noted in Table 3.10 (previous page), inspections will often be a de-centralised function, implemented out of regional offices, which means that the expertise is not centralised. As for safety reports, inspections involve numerous expert choices in applying safety management principles of Seveso and such choices can vary considerably. Therefore, training inspectors may require significant resources in most if not all countries. However, training may also represent an opportunity for addressing some of the challenges associated with the de-centralisation of expertise in inspections and building the necessary co-ordination on inspections between the authorities that share the responsibility.

Land-use planning and information to the public. In general plans for implementing these two requirements were less well-defined in the PECO countries than for other Seveso activities. However, the JRC took note that there are a few countries with strong traditions in land-use planning, such as Slovenia and Lithuania, that will be able to incorporate Seveso requirements into existing structures and institutional approaches. Almost every country indicated that providing information to the public would be a challenge, in particular, because neither industry nor the public had much experience in dealing openly with industrial risk.

Table 3.10. Allocation of Seveso Responsibilities Between Competent Authorities in PECO Countries

Activity	Lead Authority				Centralised or De-Centralised[a]	
	Environment Authorities	**Civil Protection Authorities**	**Local/ Regional Officials**	**Other**	**Mostly Centralised**	**Mostly De-Centralised**
Lead Co-ordinator of Implementation	BG, CZ, LV, PL, RO, SK, SLO	EST, H, LT			All	
Process Notifications	BG, CZ, LV, RO, SLO	H, LT, PL	SK	EST[b]	BG, H, RO, SLO	CZ, LV, LT, PL, SK
Receive Safety Reports[a]	BG, CZ, LV, RO, SK, SLO	CZ, H, PL	LT	EST[b]	BG, RO, SLO	CZ, H, LV, LT, PL, SK
Review Safety Reports	BG[c], CZ[e], LV[f], RO, SK[h], SLO	H, PL, SK[h]		BG[d], CZ[e], EST[d], H[d], LV[f]	BG, CZ[h], EST, H, LV[h], LT, PL, SK[h], SLO	
Prepare External Emergency Plans	RO	BG, H[g], LV[g], PL, SLO	CZ[h], LT, SK	EST[b]		CZ, H, LV, LT, PL, SK, SLO
Implement Inspections	BG, LV[f], PL[i], SK, RO, SLO[i]	BG, H, PL[i], SLO[i]		Labour/Health Inspectorate (BG, CZ, LT[i]) Technical Inspectorate EST, H Undecided RO	Note[k] H, LV, PL, SLO	Note[k] BG, CZ, EST, LT, SK
Land-Use Planning - Develop Strategy/Lead Implementation	BG, LV[f], PL, SLO	H, PL	CZ, LT	No information EST, RO, SK	Strategy implemented at the local level	
Information to the Public – Develop Strategy/Lead Implementation	BG, LV[i], SLO	LV[i], PL	CZ, H[h]	Not decided/ no information BG, EST, LT, RO, SK	Strategy established at the national level and implemented at the local level	

[a] If a country does not appear in either column for a specific activity, the country is undecided or the JRC has no information.
[b] No decision made by year-end 2002
[c] Parallel review in district and municipal authorities
[d] Technical Assistance Agency/Inspectorate
[e] The Ministry of Environment with the assistance of the Occupation Safety Research Institute (Ministry of Labour)
[f] The Environmental authorities with a Committee of representatives from different national and local authorities
[g] In co-ordination with District or municipal authorities
[h] Strong co-ordination between district (administrative) and civil protection authorities
[i] Joint responsibility of the Environment and Civil Protection Authorities
[i] Supported by the Energetic Inspectorate and the Technical Supervision Service
[k] Inspection is difficult to categorise as centralised or de-centralised. In most inspection organisations, functions are de-centralised by region. In these cases, countries were identified as "centralised" if there was evidence of strong involvement of a national co-ordinating authority. Despite the difficulty in classifying inspection activities in this manner, the JRC has made this attempt because solid national co-ordination is so important to effective implementation of this requirement.

3.3.5 Data and Data Management: Summary of Results of the SPIRS Survey and Related Findings

The survey aimed to understand the amount of existing data on hazardous installations, and the quality and accessibility of existing data. The responses gave the JRC a good indication of where there were still some barriers to accessibility or improvements to quality that were necessary before the data could be considered a reliable and central source of information on Seveso installations. In particular, quality and accessibility are not simple concepts that can be captured in a response to a single question. Through the survey answers, and follow-up discussions with each country, the JRC recognised patterns that indicated more clearly which factors were most important in quality and accessibility of the data.

Status of information systems to manage and assess industrial risks

By year-end 2002 all countries except Slovakia had an electronic database, maintained at the national level, containing a complete list of installations covered under Seveso (based on preliminary assessments or official notifications) including the qualifying substances held at each installation and estimated quantities. One country (the Czech Republic) had also developed an interactive relational database of installations that would allow ongoing update of the data by competent authorities. The database also includes information fields for tracking enforcement activities (e.g., inspections). Hungary and Lithuanian have similar systems under development and Slovakia and Slovenia have also outlined preliminary plans for developing systems infrastructure dedicated to hazardous installations data.

Two countries, Poland and Hungary appear to be actively engaged in developing analytical tools aimed at the assessment of risks associated with hazardous installations. The Institute of Atomic Energy (IAE) in Poland has known expertise in risk assessment that it is currently applying to a number of types of risk, both natural and technological. The IAE had recently developed a software application of the IAEA[17] risk assessment method, and as reported previously, this software formed the basis of a subsequent collaboration between the JRC and Polish experts (for translating the software into English and linking it to the SPIRS system). Hungary has installed risk assessment software within the National Directorate General for Disaster Management (NDGDM) as a tool for assessing safety reports. Slovenia is not currently developing tools specific to industrial risk assessment, but is building an information infrastructure for civil protection and in this respect will address hazardous installations.

Many countries also appear to face a logistic challenge in the application of information management tools to assist in Seveso administration and analysis. From survey responses, it appeared that access to proper software and the availability of computer equipment were more limited in some national competent authorities than others. The JRC survey did not specifically survey this particular element, but there appeared to be some variation between countries in sophistication of information management systems applied to management of hazardous installations within civil protection and environmental protection authorities at national level. More concretely, availability of computer equipment in regional and local authorities

[17] International Atomic Energy Agency

appeared to be a limiting factor in some countries, particularly since initial data collection (e.g., processing of notifications) usually occurs at local level. In addition, regional and local authorities have other Seveso responsibilities, such as emergency management and land-use planning, that could be enhanced through information management tools. Limited availability to computers in regional offices was mentioned specifically in exchanges with at least four countries (Bulgaria, Estonia, Latvia and Slovenia) and it seemed probable that other countries may also have this limitation.

Status of existing information on hazardous installations

In gathering information, the JRC sought to determine the extent to which data on hazardous installations were already available in each country. In particular, the JRC was interested in how much of the minimal data required under Article 6 of Seveso II (Plant Notifications) had already been gathered at national level. Data elements defined in Article 6 are principally as follows:

- the name or trade name of the operator and the full address of the establishment concerned;
- information sufficient to identify the dangerous substances or category of substances involved;
- the quantity and physical form of the dangerous substance or substances involved; and
- the activity or proposed activity of the installation or storage facility.

JRC considered these elements together as a basic data set for hazardous installations, To allow analyses, data sets would need to be elaborated beyond these elements.

Existence of basic data sets on hazardous installations in PECO countries

The JRC noted that six countries had been able to compile basic data sets on each Seveso installation prior to receiving any notifications. Although it should be noted that details for each data element are not entirely complete in accordance with the SPIRS structure.

The four other countries were not able to compile basic data sets prior to notification, although each one created a preliminary data set with some data. In general, these countries had the means to identify installations expected to fall under Seveso, but detailed information on quantities and substances within these installations was not available or was not easy to compile. For example, in Estonia, both national and regional authorities collect data relative to hazardous installations, but the data are not centralised and much of the data are held in paper (rather than electronic) form.

In general, the JRC found that the following factors all contributed positively to a country's effort to form a basic data set of hazardous installations and substances at a national level:

- Pre-existing legislation required hazardous installations to report type and quantity of substances present (existed in almost all of the 6 countries who had complete data sets);

Table 3.11: Countries with a Pre-Existing Databases[a]

Countries	Pre-existing Database	Principal Authorities with Data on Hazardous Installations and Substances
Bulgaria	A non-digital database is maintained by the Civil Defence Authority, of all installations meeting certain substance thresholds (very low thresholds). Bulgaria also holds complementary databases in the Technical Assessment Agency (inventory installations with increased risk) and the Regional Offices of the Ministry of Environment and Waters (installations with increased environmental hazard potential).	Civil Defence Authority Technical Assessment Agency Regional Offices of Environment and Water Ministry of Environment and Water
Hungary	Hungary has existing data based on annual reports submitted by sohazardous installations which includes an inventory of hazardous substances.	Ministry of Environment Ministry of Economic Affairs National Directorate General for Disaster Management
Lithuania	Lithuania has maintained a Register of Objects of National Significance and Hazardous Installations since 2000.	Ministry of Defence (Civil Protection Department) Country Administrative Offices of the Civil Protection Department
Poland	Hazardous substances present at each facility are listed in the databases of both the State Fire Service and the Environmental Inspectorate. These data are complemented by the database on Potential Sources of Unexpected Hazards maintained by Polish law since 1980.	Chief Inspectorate of Environmental Protection State Fire Service Labour Inspectorate
Romania	Within a PHARE project, a complete data set of installations expected to fall under Seveso, including quantities and substances, was compiled from existing data at the national and regional level.	Ministry of Waters and Environmental Protection (Risk Secretariat) Environmental Protection Inspectorates National Institute for Environment Research and Development

[a] As used here, the term "pre-existing database" refers to a database that contains all the four data elements of the SPIRS database: plant location, industry sector, and type and quantity of Seveso substances.

- Good co-ordination and data sharing exists between ministries;
- Multiple data sets exist and are mostly centralised rather than held in regional or local offices be considered official Seveso data until official notifications had been received;
- Consolidation of diverse or non-electronic data into a digital database has been the objective of a PHARE or other dedicated project; and
- Data on hazardous installations from inspection authorities have been used to cross-compare and verify data from other data sets;

Tables 3.11 and 3.12 (on the following page) separate the countries into those with existing (basic) data sets and those without, and indicate the data sources within each country, as reported by each country to the JRC.

Table 3.12: Countries Without a Pre-Existing Database

Countries	Existing Databases	Principal Authorities with Data on Hazardous Installations and Substances
Czech Republic	Although there are indications that data on hazardous installations existed previously, it does not appear that these data were unified in one database prior to implementation of the Seveso II Directive.	Ministry of Environment Ministry of Interior (Civil Protection)
Estonia	Data on hazardous installations are available from the National Statistical Board and data are also systematically collected within the Chemical Register, and by the regional Rescue and Technical Inspection authorities.	National Statistical Board National and Regional Rescue Services Technical Inspection Authorities Chemicals Register
Latvia	The Latvian Environment Agency compiles the Statistical Survey on Use of Chemical Substances and Products based on reports of material input and output that users, manufacturers and importers are required to submit by law.	Ministry of Environmental Protection and Regional Development (Regional Environment Boards) Latvian Environment Agency
Slovakia	The Slovakian Ministry of the Environment maintains some data on chemical risks related to Environmental Elements but it does not have a complete data set on hazardous installations.	Ministry of Environment
Slovenia	The GIS-UJMA system maintained by the Ministry of Defence contains some data on hazardous installations. This data was gathered from establishments on voluntary basis in 1996.	Ministry of Environment and Spatial Planning and Energy Ministry of Defence

[a] As used here, the term "pre-existing database" refers to a database that contains all the four data elements of the SPIRS database: plant location, industry sector, and type and quantity of Seveso substances.

Quality of the data

All countries appeared to have confidence in their estimate of the number of upper-tier and lower-tier installations. Indeed after some countries received notifications in the second half of 2002, numbers were not revised or only revised slightly (reduced or increased by one or two installations). In the countries with complete data sets, there also appeared to be high confidence in the accuracy of the types of substances and quantities represented in the database. (Nonetheless each country was careful to caution us that these data were only preliminary, and could not be considered official until verified with notifications and inspections.)

Compatibility of the databases with the SPIRS data management system

The JRC examined the compatibility of the hazardous installations data collected in each country with the data management system in the SPIRS software. This investigation was of interest for two reasons. Firstly, the SPIRS software tool has been designed for use in maintaining hazardous installations, and associated risk-related data, to assist Member States and Candidate Countries in Seveso implementation. In addition, the JRC records the Member State and Candidate

Country data in this system. Second, the system imposes a disciplined organisation of hazardous installations data that requires a certain level of detail on each installation and also characteristics necessary for performing certain risk-based screening routines.

In particular, the JRC assessed whether the data:

- allows installations to be located with GIS mapping. The SPIRS software requires geo-referenced locations;
- categorises installations according to the typology for industry sectors within SPIRS;
- categorises substances in the database using classifications provided within Council Directive 67/548/EC for the Classification and Labelling of Substances;
- includes quantities of the substance or substances at the installation triggering Seveso coverage;

and whether complementary geo-referenced data exist that would allow area risk mapping, for example, GI maps of population distribution, sensitive natural resources and land conservation areas.

The JRC had sufficient information from each PECO country to conclude that there would not be significant obstacles to using the data from most countries within the SPIRS framework. Nonetheless, complete characterisation of the data in accordance with the SPIRS protocols is not possible given current data classification structures in the PECO countries (see Table 3.13, next page). Of all the countries, only Romania's data was fully compatible with the SPIRS data, including complete categorisation of each installation by industry type and by quantity and type of substance. The hazardous installations data compiled by Romania was assembled and classified in an electronic database as part of a PHARE Twinning project with Danish partners.

Findings in relations to compatibility and completeness of the data held by Candidate Countries can be summarised as follows: Plant identification (by location). Five countries stated that they have the exact geo-reference location of the installation. Four others indicated that the street addresses of installations are available, however, they are not geo-referenced. Slovakia did not yet have complete information on the location of potential Seveso installations, but such data would be collected as part of the notification process.

Industry type. Industry typology varied widely with only Romania using the same typology as SPIRS. It appeared that most countries used their own industry classifications which in large part did not match the SPIRS categories (resulting in a large "other" category for installations in the five countries that have provided data for SPIRS).

Substance classification. Data classification varied most widely as to industry type and quantity of substance at the installation. All of the countries will be required to classify substances in line with Council Directive 67/548/EC, and many have already implemented this requirement. Therefore, classification of substances at Seveso sites will be uniformly in accordance with European law, and by extension, the SPIRS software, in these countries.

Table 3.13: Compatibility of Hazardous Installations Data in PECO Countries with SPIRS Data Management System

Category	Fully Compatible	Partially Compatible	Not compatible	Little or no information
Geo-referenced Locations	CZ, EST, H, LV, LT, SLO	BG, PL, RO	SK	
Industry Type	RO	CZ, EST, LV, LT, PO		BG, H, SK, SLO
Hazardous Substance Classification	CZ, EST, H, LV, LT, PL, RO			BG, SK, SLO
Quantity of Hazardous Substance	LT, RO	CZ, EST, H, LV, PL		BG, SK, SLO

Quantity of substances. Recording of the quantity of substances appears to vary among the countries who gave specific information on this category. In Poland and Latvia a maximum quantity (per year) is required; Latvia also requires an average quantity. Lithuania and Romania record exact quantities (presumably at the point in time when the quantity is recorded). Estonia only records whether the quantity of the substance falls within a specific range (specific ranges possible vary according to each chemical).

Data Available for Area Risk Mapping. Geo-referenced data showing administrative regions and land cover are available for all countries (see Table 3.14). Detailed population density maps are unavailable for all but two countries at present. However, Slovenia and Lithuania have historically maintained detailed building and population registers. Slovenia has mapped these data in geographic information system; it was not clear to us whether Lithuania had yet done so. According to Eurostat, population maps for all PECO countries should be available sometime in 2003.

A number of Seveso competent authorities are actively applying GIS software to assist with environmental and emergency response planning, mostly for visualisation purposes. Estonia, Hungary, Poland, and Slovenia all gave the JRC demonstrations of the mapping capabilities of the environment and civil protection authorities during on-site meetings in those countries. A few Seveso competent authorities, notably Slovenia, are also exploring options for developing analytical tools for use in combination with mapping software. A minority of countries (i.e., their Seveso competent authorities) were less familiar with the availability of these types of GIS data in their country, even though it exists through Eurostat, which indicated that application of GIS technology was less widespread in those competent authorities. Moreover, there was demonstrated interest from several countries in the application of the JRC's ARIPAR software to area risk.

Table 3.14: GI Data Available for Area Risk Mapping

Administrative Regions
All countries
Sensitive Areas
All countries
Population and Density
SLO

Chemical accident databases

The JRC did not specifically seek information on databases in each country that recorded chemical accidents. However, through documentation provided by PECO countries and its own research, the JRC learned that all countries more or less have records of past industrial accidents involving dangerous substances. Events recorded prior to regime change, however, tend to contain few details and the facts that are provided surrounding the event are often unreliable. In many countries, there is not a single unified database containing such incidents; rather such records have been maintained within a number of authorities, and even regional offices.

Nonetheless, following regime changes in 1989-90, several countries have established unified databases for recording various types of disasters or accidents, including industrial accident events. The JRC was able to confirm that Estonia, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia have all created unified databases on emergency events or accidents, in the context of civil protection or environmental protection, that include some records of industrial accidents, and that include criteria and requirements to assure the information is of good quality and sufficient detail. Most of these databases have only been in existence a few years. At least three countries maintain records on chemical accidents originating not only in fixed installations but also in transport within their databases. At least one also records pipeline incidents. Details concerning elements of the actual records kept by these countries are not known.

In addition, the year 2002 marked the first year of existence for the Czech Republic's major industrial accident database established as part of Seveso II implementation. In March 2003 Hungary's industrial accident database for Seveso II will also have been activated.

This information is provided here because it is of general interest in the study of chemical accident prevention and may be of interest to explore in future. Accident databases were not, however, a particular focus of this project.

3.4 CONCLUSIONS AND RECOMMENDATIONS

Through training, collaborations and information gathering activities of this project, the JRC was able to reach a number of conclusions about the progress of PECO countries in implementing the Seveso II Directive. Above all, this information has allowed the JRC to estimate with greater certainty the level and type of technical support that may be further required in the various countries to enhance Seveso implementation, particularly in the areas of expert training, programme development, and information systems development.

3.4.1 Conclusions

- 1.104 new Seveso installations. The accession of the ten central and eastern European countries in 2004 will bring in a significant number of hazardous installations required to comply with the Seveso Directive. There are an estimated 1.104 Seveso installations in central and eastern European countries of which 835 may be required to comply with the Directive before 2005. The increase is expected to augment total Seveso installations in Europe by fifteen to twenty percent once accession of all ten countries has occurred.
- Transposition and implementation activities ongoing. Six countries have completed transposition of the Directive and have started implementation; the remainder are actively preparing for implementation. Training, awareness and programme development activities are well underway in all countries. Whether in the implementation or the preparation phase, every country is currently devoting considerable resources to raising awareness of the new requirements in government and industry, providing specialist training to competent authority staff, evaluating possible approaches to risk assessments, developing technical guidance, testing strategies through pilot projects, establishing programmatic structures and procedures, and building information systems for managing specific tasks and information.
- Establishing appropriate expertise and infrastructures. Effective implementation following transposition of the Seveso Directive in reality will take time; the availability of appropriate expertise and implementation tools could accelerate this time frame. The Seveso Directive represents an approach to accident prevention of a significantly higher level than is currently in place in candidate countries. Existing expertise and infrastructures for managing industrial risks must likewise be substantially adapted to accommodate this dramatic change of approach.
- Benefits realised from EU programmed. Funding and expertise from within the European Community for Seveso implementation have made valuable contributions to Seveso implementation in PECO countries. Implementation in Candidate Countries appears to benefit from technical exchange with other countries and access to their expertise**.** In particular, there have been tangible gains in knowledge and implementation tools and strategies from interactions with EU experts through Phare twinning projects and through European Commission technical support activities sponsored by DG-Environment and the JRC. Additionally, technical exchanges occurring under the umbrella of European and international co-ordination efforts for implementing accident prevention protocols have also been valuable forums for information exchange.
- Support needed for building expertise in risk assessment and industrial safety management. According to most countries, expertise in core disciplines, namely, risk assessment and industrial safety management, available within the competent authorities is relatively low. These two competencies are central to effective strategic planning and implementation of many provisions of the Directive, including the evaluation of safety reports, conduct of inspections, and land-use planning. However, many countries are only at the beginning of

developing their strategy and training personnel. Moreover, expertise in risk assessment or development of safety management systems does not appear to be widespread in their industries.

- <u>Broad distribution of Seveso responsibilities.</u> Shared responsibilities and decentralised functions may place an extra burden on training and development of expertise for enforcing certain areas of the Directive in some countries. Distribution of responsibilities across a wide spectrum implies the need for good co-ordination and the application of a shared approach to Seveso enforcement, including criteria and methodology.

- <u>Data management and mapping of hazardous installations.</u> Hazardous installations data are not fully mapped or categorised in all the PECO countries and the JRC does not yet have a complete inventory in SPIRS of Seveso installations that are expected to be covered by the Seveso Directive in these countries. Some countries have supplied the JRC with data but not all their installations have been geo-referenced or organised in the SPIRS structures. Other countries have failed to provide JRC with the data for security reasons or on the grounds that sharing such data with the Commission should take place only after accession.

- <u>Spatial mapping of population and population density.</u> In regard to data, GIS information is available for administrative divisions and land cover (natural features, population, etc.) of all countries. However, few countries have population and population density mapped in any useful detail that could limit spatial applications to assist risk assessments. For a small number of countries, access to geo-referenced data and GIS software may also be a limiting factor.

- <u>Need for effective information management applications.</u> All countries are looking for information management and risk assessment tools that could enhance Seveso implementation, or are interested in developing or adapting tools for customised use. Many countries are planning to develop relational databases for maintaining hazardous installations data and tracking enforcement activities. All countries appear interested in obtaining tools for enhancing spatial and quantitative analysis of industrial risk. Several have experimented with the ARIPAR tools developed by the JRC and one country is already planning to apply these tools in a pilot project on risk assessment.

- <u>Resource constraints.</u> The capacity to apply information management tools to spatial and quantitative analysis of data is limited in many countries. Some countries face a logistic challenge, others lack the proper data, and some countries are confronting both these obstacles. Obtaining computer equipment is a resource problem for many countries, both in terms of purchasing updated software and customised programmes but also in terms of volume of equipment, whereby many local and regional authorities do not have access to updated equipment, or to any computers at all, in some cases.

3.4.2 Recommendations

Given the status of implementation in each country and particular challenges that could slow the pace of progress, the JRC believes there are several areas where ongoing technical support of Candidate Country efforts could be very beneficial. Any such support activity should take into consideration the recommendations that follow.

Recommendations in this section are aimed primarily at future activities of the JRC, and there has been no attempt to make recommendations outside this framework. Moreover, based on its experience with the PECO countries, the JRC could consider extending its support activities to all Candidate Countries and it has recommended doing so in the enlargement project for management of natural and technological hazards in the Sixth Framework Programme. Therefore, the recommendations below have been designed to include all Candidate Countries.

- Continuation of Seveso technical support in the Sixth Framework Programme. Seveso implementation programmes in Candidate Countries continue to benefit from access to EU expertise and implementation tools and the JRC can make a valuable contribution in this regard. The JRC has specific expertise in a number of areas that support Seveso implementation, industrial risk assessment, and development and application of data management, data analysis and decision support tools, and general application of the Directive in the Member States. In addition, through collaborative research projects and expert workshops, the JRC can also facilitate access of the Candidate Countries to expertise and tools available in the Member States. These activities have already been included in the MAHB/NEDIES project under JRC enlargement in the Sixth Framework Programme.
- Timing of JRC assistance. The contribution of JRC resources will have a maximum effect from now on to the next three to four years, as implementation programmes are being launched and tested. During this time all the Candidate Countries will be establishing and testing administrative procedures, building information management infrastructure, carrying out training programmes and establishing and testing criteria and methodologies to guide enforcement.
- Variety of needs. It may be beneficial to offer participation options to Candidate Countries within the new JRC enlargement project on this topic in order to accommodate different needs in relation to technical expertise. The level of expertise required for enforcing different provisions, for example, performing risk assessments or developing land-use planning strategies, can vary substantially from country to country. The need for implementation tools, such as data management or risk assessment software, and the need for information on best practices in various programme areas, e.g., inspections and land-use planning, may also be of different proportion in different countries. The number of staff needing a certain type of information, and their distribution in terms of competency, location or other factors, may also vary.
- Focus on risk assessment and safety management. It may be beneficial to offer options for project participation that accommodate Candidate Countries in different stages of implementation. In the early stages of implementation, countries have the strongest need for information about practices related to risk assessment and the evaluation of safety reports and safety management systems. Knowledge and tools to implement inspection practices, emergency planning, land-use planning and provide information to the public become more critical at later stages, as countries approach safety report deadlines.
- Access to JRC information and expertise. It may also be useful to consider options that allow broader distribution and access within the competent authorities to certain information and tools developed within the project. Often various responsibilities and functions associated with Seveso implementation are

shared by more than one competent authority or are exercised by personnel operating out of a number of different geographical locations. The JRC should take into consideration how the structure and documentation of project actions can best be developed to provide the best value in exchange for effort.

- Collaborative research. With this in mind, the JRC should continue to seek opportunities to work bilaterally and multilaterally with Candidate Countries on Seveso-related research, in particular in the area of risk assessment. There is a substantial need to build expertise in this area for Seveso implementation in Candidate Countries. Hosting detached national experts or visiting scientists from Candidate Countries to work on common research objectives related to Seveso II is one way of directly assisting countries in building their expertise. Another option is funding participation of Candidate Countries in direct collaborations with the JRC on research. Collaborations with the JRC hold a double advantage in that they help build expert knowledge in the Candidate Countries but also contribute to overall knowledge in this area.

- Collaboration on information management applications. The JRC should continue to seek opportunities to work bilaterally and multilaterally with Candidate countries on the development of information management software and systems to support Seveso implementation. JRC expertise in the development of GIS, data management, data analysis, and decision support tools has already been applied successfully to a number of risk management scenarios, including industrial risk management. Candidate countries are already seeking information management tools to enhance administration and enforcement of Seveso requirements, and the need to develop and adapt information management tools for this use is expected to persist over the next several years.

- Management of hazardous installations data. Assistance is needed in some Candidate Countries to manage and analyse hazardous installations data; moreover, sharing this data with the JRC should be encouraged. Hazardous installations databases are not complete in some countries, and in other countries certain data elements are lacking. In particular, the ability to map installations electronically and the breakdown by industry sector should be uniform or nearly uniform in Europe. Moreover, sharing the data with the Commission helps to support its efforts to represent competent authority interests on questions at a European level relating to major hazard control.

- Participation in current Seveso activities. The JRC can support opportunities to share best practices for Seveso implementation between Candidate Countries and Member States. Participation of Candidate Countries in EU technical working groups, such as the Technical Working Group on Land-Use Planning managed by the JRC and the programme for Mutual Joint Visits on Inspections Under Seveso II are valuable forums for sharing information and contributing to the development of best practices. In addition, the JRC can also encourage participation of Candidate Countries in EU-funded shared-cost research projects that support Seveso implementation.

- Opportunities for JRC Training. JRC courses and workshops to provide training on software support tools for Seveso II and on Seveso implementation remain relevant mechanisms for creating the necessary skill base and knowledge base within competent authorities. The MARS/SPIRS software training was successful in introducing Seveso reporting software and JRC resources and expertise to competent authority staff. A software demonstration session at the end of the November seminar in Ispra was also considered a useful experience for the participants. During the next several years, the Candidate Countries will continue to have a strong demand for training of competent authority staff. Therefore, any contribution to training that the JRC can offer in relation to its competence would be welcome. Training to support the use of software, risk assessment techniques or general implementation of the Directive are an example of some areas where the JRC could add some value.

Chapter 4 Natural Hazards - Project Activities and Accomplishments

4.1 Background

With regards to natural hazards, there is no legal act like the Seveso Directive that directly binds the PECO Countries with regard to the *acquis communautaire*. However, there are several programmes launched by the European Commission that indirectly require knowledge-sharing with the Candidate Countries (see Table 4.1). In addition, the March 2001 seminar highlighted the risk relevance of natural hazards in the ten participating countries.

Table 4.1 portrays the existing Community legislation upon which the JRC institutional activities[18] in the field of natural disaster risk management is based upon.

Table 4.1: Main Community Legislation that Addresses Natural Hazards

Natural Hazard	Policy Area	Existing Community Legislation
All	Environment	Resolution of the Council and the Representatives of the Governments of the Member States, meeting within the Council of 1 February 1993 on a Community programme of policy and action in relation to the environment and sustainable development - A European Community programme of policy and action in relation to the environment and sustainable development
All	Environment	Decision 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the 6th Community Environment Action Programme
All	Research	Decision No 182/1999/EC of the European Parliament and of the Council of 22 December 1998 concerning the fifth framework programme of the European Community for research, technological development and demonstration activities (1998 to 2002)
All	Research	Decision No 1513/2002/EC of the European Parliament and of the Council of 27 June 2002 concerning the sixth framework programme of the European Community for research, technological development and demonstration activities, contributing to the creation of the European Research Area and to innovation (2002 to 2006)
All	Humanitarian Aid	Council Regulation (EC) No 2012/2002 of 11 November establishing the European Union Solidarity Fund
All	Regional	Objective 2 – revitalising areas facing structural difficulties, e.g. a crisis situation in urban areas
Floods	Environment	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy
Forest Fires	Environment	Regulation (EC) No 1485/2001 of the European Parliament and of the Council of 27 June 2001 on protection of the Community's forests against fires – amending Council Regulation (EEC) No 2158/92 on protection of the Community's forests against fires

Note: This table is not meant to exhaustive. Its aim is to give an insight of recent Community legislation that partially or totally address natural hazards.

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[18] There are four main projects at the JRC that address natural hazard-related issues: NEDIES (http://nedies.jrc.it; Natural Hazards: http://natural-hazards.jrc.it; Digital Map Archive Project: http://dma.jrc.it; Earthquake Engineering for Structural Assessment: http://elsa.jrc.it/earthquake/index.htm).

Against this background, the JRC NEDIES Team ensured that the Candidate Countries were made aware of existing initiatives in the field of natural disaster risk management.

4.2 Project Workplan for Natural Hazards

The approach that was taken in the field of natural hazards was driven by the outcome of the March 2001 seminar. During that seminar, it was highlighted that the following natural hazards (see Table 4.2) were those that needed to be addressed, given their relatively higher frequency of occurrence and the number of countries that are affected by them. Furthermore, Table 4.2 qualitatively shows the risk relevance to each of the candidate countries with respect to these natural hazards.

Table 4.2: Risk Relevance[a] of Natural Hazards in PECO Countries

Country \ Natural Hazard	Floods	Storms	Landslides	Forest Fires	Earthquakes
Bulgaria	Medium	Low	Medium	High	High
Czech Republic	High	Medium	Low	Medium	Low
Estonia	Low	Medium	Low	Medium	Low
Hungary	High	Low	Low	Medium	Low
Latvia	Medium	Low	na	Medium	na
Lithuania	Medium	Medium	Low	Medium	na
Poland	High	Medium	Low	High	Low
Romania	High	High	High	Medium	High
Slovak Republic	Low	Low	Low	Low	Low
Slovenia	High	Low	Medium	Medium	High

	High[b]
	Medium
	Low
na	Not relevant

[a] Important: These estimates are based on perceptions of representatives of the competent authorities working within the project. As such, they represent only indications of relevant importance of certain hazards in each country, and are intended to be treated as rough estimates only.

b See Table 2.1, p. 40, for definition of these categories.

The majority of project resources were concentrated on industrial hazards due to the importance of ensuring that the Candidate Countries transpose the Seveso Directive into their national framework. However, various activities were also carried out in the field of natural hazards. In particular, Candidate Countries were encouraged to participate in all NEDIES activities targeted to EU Member States.

Each country participated to some extent in natural hazards activities of this project, but the character of involvement varied from country to country. According to the project work plan, natural hazards objectives were more modest than those identified for hazardous installations. In particular, it was expected that the ability of some countries to participate in the natural hazards side would be constrained by level of resources devoted to the Seveso side. Therefore, the work plan for natural hazards management was defined to allow different levels of participation, but guaranteeing a minimum level of information exchange through the surveys, on-site training meetings and project-specific seminars.

Specifically, the JRC targeted four main NEDIES for Candidate Country participation. These were:

- NEDIES expert meetings and workshops;
- the NEDIES disaster reporting system;
- the NEDIES clearing house of information in the field of natural disaster risk management; and
- data collection towards better understanding of disaster management in candidate countries.

Table 4.3 summarises the various activities in which the Candidate Countries took part for the duration of the project.

4.2.1 NEDIES Expert Meetings and Workshops

Six PECO countries (Bulgaria, Czech Republic, Hungary, Romania, Slovakia and Slovenia) participated in the workshops on natural hazards issues sponsored under the JRC's NEDIES project. The aim of the NEDIES expert meetings and workshops is to provide an interdisciplinary platform for dialogue in order to facilitate the exchange of information between all the actors involved in the management of natural disasters and technological accidents. With view to enlargement, they also provide an

Table 4.3: Participation in NEDIES Activities

Activity / Country	Lessons Learnt from Flood Disasters	Lessons Learnt from Landslide Disasters	Lessons Learnt from Forest Fire Disasters	Lessons Learnt regarding Dissemination of Information	Request for Access to NEDIES Website Password Protected Area	Total Number of Meeting and Workshop Participation (TOTAL = 4)	Total Number of NEDIES Contributions (TOTAL = 5)
Bulgaria	❑	☑	☑	☑	☑	3	4
Czech Republic	☑	☑	❑	❑	☑	2	3
Estonia	❑	❑	❑	❑	❑	0	0
Hungary	❑	☑	❑	☑	☑	2	3
Latvia	❑	❑	❑	❑	☑	0	1
Lithuania	❑	☑	❑	❑	❑	1	1
Poland	❑	❑	❑	❑	☑	0	1
Romania	☑	☑	☑	☑	☑	4	5
Slovak Republic	❑	❑	❑	❑	☑	0	1
Slovenia	☑	☑	☑	❑	☑	3	4

alternative networking mechanism between EU Member States and Candidate Countries to exchange experiences and identify synergies. A main output of these events is the publication of an official European Commission EUR report, which is disseminated to DG Environment, EU and Candidate Countries Civil Protection Authorities and interested parties. Furthermore, the report is also made available to the public at the following URL: http://nedies.jrc.it/pag_reportsissued.asp.

4.2.2 NEDIES Disaster Reporting System

The NEDIES disaster reporting system is a repository of lessons learnt from disasters. It aims to provide lessons learnt information in the following disaster management phases: prevention, preparedness and response. Furthermore, it includes lessons learnt in disseminating information to the public in the above-mentioned phases. This reporting system is password-protected. A username and password can be obtained at this URL: http://nedies.jrc.it/NediesPriv/.

The lessons learnt are presented in a pre-established format, using a *disaster form*. Authorised experts are able to consult existing disaster forms and also fill insert lessons learnt from disasters, so as to share best practice and identified difficulties with other countries, with the scope of contributing towards the improvement of disaster management and mitigation. The disaster forms are not meant to be exhaustive. They offer a brief description of events, but their main purpose is to highlight lessons learnt information to users. If more information were to be required regarding a reported disaster in the NEDIES system, details of the compiler are available.

With a view to this activity, the NEDIES Team encouraged Candidate Countries to request for a username and password and dynamically use the NEDIES system. By the end of 2002, almost every country had signed up to the NEDIES system. Over the course of the project, twenty (20) natural events were contributed to the NEDIES system from PECO countries.

4.2.3 NEDIES Clearing House of Information in the Field of Natural Disaster Risk Management

The task of the NEDIES Team within the Enlargement Project No. PA 26 was to ensure that Candidate Countries were made aware of the activities carried out by the European Union at Community, national, regional and local levels, especially those carried at by the European Commission, in line with the Subsidiarity Principle.

4.2.4 Data Collection towards Better Understanding of Disaster Management in Candidate Countries

To complement the three other work plan activities, the NEDIES Team also aimed simultaneously to learn more about the disaster management processes in these countries. This activity was considered important for the following reasons:

1. to have a better understanding of disaster management actors, systems and processes in Candidate Countries as a context for future Commission initiatives in this area;
2. to identify experts and competent authorities for participation in future technical exchanges and collaborations;
3. to target specific assistance to the Candidate Countries, particularly within the Sixth Framework Programme (FP6); and
4. to carry out analyses of disaster management practice and lessons learnt from disasters, in order to share experiences with all EU and EU-Accession countries.

In addition to the lessons learnt contributions, other types of information collected from PECO Countries were:

- identification of the leading competent authorities and principal legislation;
- the existence of disaster and climate databases;
- the existence of flood risk management plans and maps;
- a description of the flood risk management process;
- the flow of information between competent authorities, experts and the public relative to natural hazards management;
- the frequency of occurrence of natech (natural-triggering-technological) disasters; and
- priorities and needs of PECO countries for natural hazards management.

This next section is dedicated to the evaluation of the information collected directly from the Competent Authorities.

4.3 Project Accomplishments and Findings

All countries met, and some greatly exceeded expectations concerning participation in natural hazards activities of this project. Half the countries participated in the NEDIES technical exchange workshops taking place in 2001 and 2003. Each country contributed information that added to JRC's knowledge about natural hazards management and priorities in their jurisdictions. A minimum level of information was obtained for each country and collectively, the JRC's understanding of natural hazard priorities, needs and capabilities was expanded as a result of the project.

4.4 Project Findings

To obtain a minimum level of new information, the JRC directed targeted requests for information to the PECO countries during the project, specifically for presentations on aspects of natural hazards management at the seminars and MARS/SPIRS training sessions, and for the completion of three questionnaires on natural hazards. All countries responded to at least one of those requests, and some countries to all of them. Responses were generally of high quality, and sometimes very thorough. A number of other countries each contributed a lessons learnt report on natural disasters to the NEDIES information exchange website. Presentations on natural hazards priorities were also given at both the March 2001 seminar and November 2002 seminar and at SPIRS/MARS training meetings.

As was also expected, JRC's information resulting from these efforts varies in quality and quantity depending on the country and the natural hazard involved. All countries provided the same base level of information expected, that is, an estimation of the risk relevance of natural hazards, and a brief description of the needs and priorities for natural hazards management in their country. All countries were very co-operative with the JRC's efforts to obtain this information, and their efforts in this regard represent a significant contribution, in particular, considering the range of hazards that were addressed.

In addition, several others also provided explanatory details that further illustrated the natural hazard situation in the country.

4.4.1 Leading Competent Authorities

Disaster management can only be addressed with a multi- and inter-disciplinary approach. This automatically implies that there are various institutions with varying competences involved in addressing natural hazards. As noted in Table 4.4 (pp. 92-93), in some countries, such as Estonia, Romania and Slovenia, the same competent authorities manage all the natural hazards covered in this project, which allows them to address natural hazards more effectively by applying a multi-hazard approach. Other countries have a multi-disciplinary but more sectoral approach in dealing with natural hazards.

The following contains a short description of the distribution of responsibilities among the competent authorities in relation to each hazard within Bulgaria, Estonia, Hungary, Lithuania, Poland, Slovakia and Slovenia.

Bulgaria

The Civil Protection Agency (CPA) manages most types of emergency situations. The Ministry of Environment and Water (MOEW) is the responsible institution for contaminated lands and transboundary pollution. The MOEW has regional directorates and monitoring points as well as mobile laboratories. For certain types of emergencies (e.g, dangerous release of mercury or other toxic substances into water), the Civil Protection Agency takes immediate control of the situation. Management of forest fires falls under the direction of the Central Fire Brigade which is part of the Ministry of Interior. The Fire Brigade often works in collaboration with the CPA (and also often is supported by local volunteer brigades).

The Bulgarian Academy of Sciences collects data and information on natural disasters within the following institutes:

- The National Institute of Meteorology and Hydrology (NIMH) collects data on meteorological and hydrological events.
- The Geophysical Institute (GPI) gathers sensory data on earthquakes touching Bulgaria territory and provides this data to the Civil Protection Agency when an event occurs. The Institute also supplies data to the media for public dissemination and also to other government institutions upon request.
- The Geological Institute and the Geographical Institutes maintain data and mapping information for other natural hazards.

Estonia

In Estonia, the Ministry of Internal Affairs and the Estonian Rescue Board are the lead organisations, while the Ministry of the Environment, the Estonian Meteorological and Hydrological Institute, and the Environmental Inspectorate are the co-ordinating organisations.

Hungary

Responsibility for addressing various natural hazards is distributed between various authorities at national, regional and local level in Hungary. The Governmental Co-ordination Commission is responsible for the preparation and co-ordination of decisions related to disaster management. The Chairman and Deputy Chairman of the Commission are the Minister of the Interior and the chief secretary for the ministry most affected by the disaster. The Commission is supported by a Technical and Scientific Council and it is in charge of the Emergency Response Centre housed within the National Directorate General for Disaster Management.

The Ministry of Environment and Water and the Ministry of Economic Affairs, along with the Ministry of Interior, also manage Working Groups for Civil Protection that that take the lead in co-ordinating specific actions as follows:

- earthquakes, nuclear emergencies, immigration – Ministry of the Interior;
- floods and inland water problems, transport accidents, transboundary water pollution – Ministry of Environment and Water; and
- industrial and mining accidents – Ministry of Economic Affairs.

The regional and local authorities also run civil defence committees and the headed by the head of the County General Assembly and the local mayor, respectively. These committees are supported by the regional and local branches of the National Directorate General for Disaster Management. The National Directorate, and its regional and local affiliates, plays a leadership role in prevention of disasters as well as crisis management and rescue operations.

The Water Directorates take the lead in coping with floods. The Bureau of Forestry, in particular, the Forestry Administration and Forestry Conservancy Department, manages the prevention phase of forest fire management, whereas the Forestry Service Directorates, in particular, the Forestry Service, carries out the co-ordination of the defence against forest fires. The organisation of storms, landslides and earthquakes, lies in the hands of mayors and the County Defence Committee. If necessary, the Defence Working Group is also mobilised to intervene in the event of an earthquake or severe storm.

Lithuania

In Lithuania, the Civil Protection Department at the Ministry of Defence takes the lead on inundation hazards, county administrations and municipalities tend to address storms. Given that landslides are not considered a high risk, associated prevention and preparedness activities are entailed to the municipalities. Forest fires are under the joint jurisdiction of the Fire Protection and Rescue Department and Ministry of

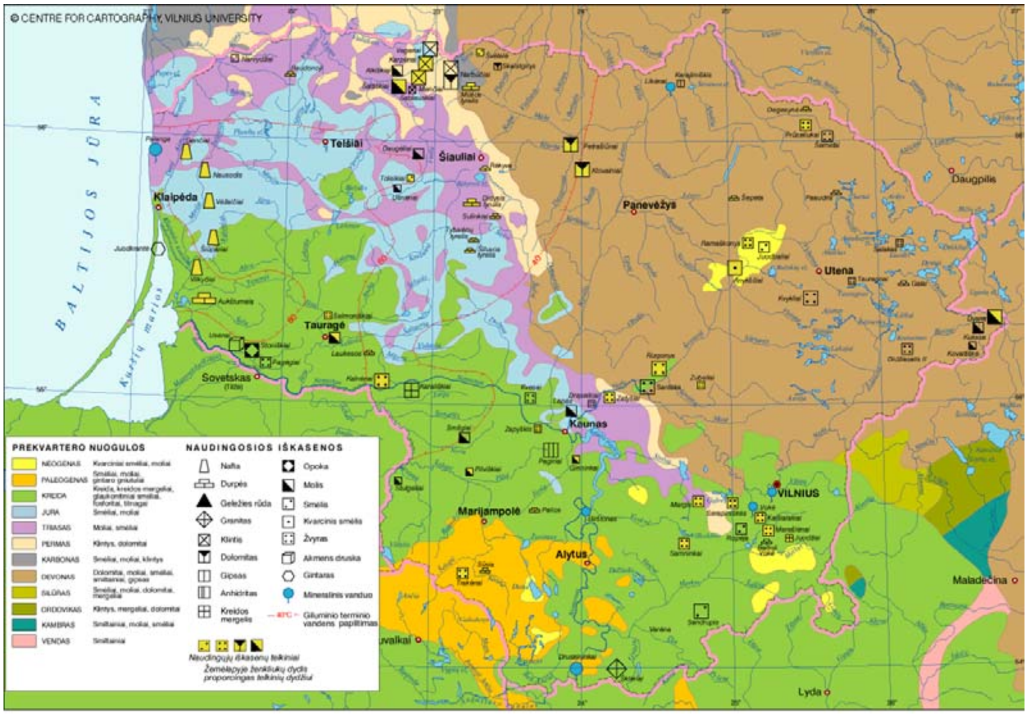

Figure 4.1: Geology of Lithuania
(source: http://www.balticdata.info/maps/Lithuania/images/041_0904_geo_big.gif)

Environment. Since Lithuania is not prone to earthquakes, no lead organisation has been established to address this hazard.

Poland

Major natural hazards affecting Poland, i.e., floods, storms and forest fires, appear to be addressed in a very targeted manner, with very specific prevention and preparatory actions assigned to each one. The Institute of Meteorology and Water Economy are responsible for monitoring floods and storms. The State Forests Board and the Forests Research Institute takes care of monitoring forest fires. Moreover, for floods and forest fires, a special group of actors has been designated to take care of hazard identification and supervision. Earthquakes (a lower risk event) are monitored by the National Geology Institute. Leaders of local and governmental authorities at each administrative level (commune, district, province, state) for the former, whereas the National Rescue and Fire-fighting System (the State Fire Service, Voluntary Fire Brigades) are in charge of crisis management and rescue operations for all these natural hazards.

Romania

In Romania, the Government Commission for Defence against Disasters is led by the Prime Minister and supported by the various Ministries. The Commission relies on Central Commissions for Defence that specialise in preparation for and management of particular disasters including::

- Floods, dangerous weather phenomena and hydro-technical construction accidents;
- Earthquakes and landslides; and
- Extended fires.

Slovakia

In the Slovak Republic, the Ministry of Interior's Office of Civil Defence is always involved in managing all natural hazards together with other administrations. The Ministry of Environment of Slovak Republic's Department of Geology and the Geological Survey is responsible for programmes to address geological hazards. The Slovak Hydro-meteorological Institute is in charge of programmes for floods and storms. The Slovak Environmental Inspection and the Ministry of Environment of Slovak Republic, Water Protection Department also share responsibility for flood prevention and preparedness. The Ministry of Interior, in particular, the Presidium of Fire Protection and Rescue Service, together with the Office of Civil Defence are responsible for forest fire prevention and preparedness programmes.

Slovenia

Like Estonia, management of natural hazards prevention and preparedness is centralised at the national level in Slovenia, with responsibilities shared between two ministries in close co-ordination with each other. The Slovenian Ministry of the Environment, Spatial Planning and Energy is responsible for prevention and remediation activities, whereas the Ministry of Defence, Administration for Civil Protection and Disaster Relief is in charge of preparedness and response initiatives.

4.4.2 Principal Legislation

Table 4.5 (pp. 94-97) highlights the existing national legislation for each natural hazard that is presently in force in the PECO Countries. What can be observed are the following:

Legislation differs to a substantial degree from country to country. Only Estonia, reported three legal acts covering all types of natural hazards. According to the information provided, Estonia, Latvia and Lithuania do not have any form of legal act to cover earthquakes, as they very rarely occur in these countries. This can be expected, given that the Baltic countries are geologically very stable. Figure 4.1 (previous page) shows how Lithuania is mostly made up of very old rock formations of the Devonian (brown) and Cretaceous (light green) Periods. The situation is similar in the entire Baltic region.

Table 4.4 (a): Leading Competent Authorities for Natural Disaster Management in Candidate Countries

Country	Floods	Storms	Landslides	Forest Fires	Earthquakes
Bulgaria	▪ Civil Protection Agency ▪ National Institute of Meteorology and Hydrology	▪ Civil Protection Agency ▪ National Institute of Meteorology and Hydrology	▪ Civil Protection Agency	▪ Central Fire Brigade	▪ Civil Protection Agency ▪ Geophysical Institute
Czech Republic	▪ Ministry of the Environment ▪ Ministry of the Interior ▪ Central Flood Protection Commission	▪ Ministry of the Environment ▪ Ministry of the Interior	▪ Ministry of the Environment ▪ Ministry of the Interior	▪ Ministry of the Environment ▪ Ministry of the Interior	▪ Ministry of the Environment ▪ Ministry of the Interior
Estonia	Leading organisations – Ministry of Internal Affairs, Estonian Rescue Board Co-ordinating organisations – Ministry of the Environment, Estonian Meteorological				
Hungary	▪ Water Directorates (I, II, III scale) ▪ National General Water Directorate ▪ National Directorate General for Disaster Management (NDGDM) ▪ National Technical Managing Headquarters [base: Ministry of Environment and Water Management]	▪ Mayors ▪ County Defence Committee ▪ NDGDM	▪ Mayors ▪ County Defence Committee ▪ NDGDM	▪ *<u>Prevention</u>*: Bureau of Forestry-Forestry Administration and Forestry Conservancy Department ▪ *<u>Defence</u>*: Forestry Service Directorates-Forestry Service ▪ NDGDM ▪ Municipal fire brigade	▪ Mayors ▪ County Defence Committee ▪ Working Group for Civil Protection
Latvia	State Fire and Rescue Service				
Lithuania	▪ Civil Protection Department at the Ministry of Defence: Emergency management and co-ordination ▪ Ministry of Environment: Monitoring and laboratory control ▪ Fire Protection and Rescue Department at the Ministry of Interior: Rescue operations ▪ County administrations: Responsible for emergency management and co-ordination in case of county-level emergencies ▪ Municipalities: Responsible for emergency management and co-ordination in case of local-level emergencies				

Table 4.4 (b): Leading Competent Authorities for Natural Disaster Management in Candidate Countries

Country	Floods	Storms	Landslides	Forest Fires	Earthquakes
Poland	▪ *Monitoring*: the Institute of Meteorology and Water Economy ▪ *Hazards identification and supervision*: the National Board of Water Management (deadline of implementation: 01.01.2004) ▪ *Crisis management*: Leaders of local and governmental authorities at each administrative level (commune, district, province, state) ▪ *Rescue operations*: the National Rescue and Fire-fighting System (the State Fire Service, Voluntary Fire Brigades)	▪ *Monitoring*: the Institute of Meteorology and Water Economy ▪ *Crisis management*: Leaders of local and governmental authorities at each administrative level [commune (gmina), district (powiat), province (województwo), state (kraj)] ▪ *Rescue operations*: the National Rescue and Fire-fighting System (the State Fire Service, Voluntary Fire Brigades)	▪ *Crisis management*: Leaders of local and governmental authorities at each administrative level (commune, district, province, state) ▪ *Rescue operations*: the National Rescue and Fire-fighting System (the State Fire Service, Voluntary Fire Brigades)	▪ *Monitoring*: the State Forests Board, the Forests Research Institute ▪ *Hazards identification and supervision*: the Ministry of Environment, Leaders of local and governmental authorities at a district and province administrative level, the State Fire Service ▪ *Crisis management*: Leaders of local and governmental authorities at each administrative level (commune, district, province, state) ▪ *Rescue operations*: the National Rescue and Fire-fighting System (the State Fire Service, Voluntary Fire Brigades)	▪ *Monitoring*: the National Geology Institute ▪ *Crisis management*: Leaders of local and governmental authorities at each administrative level (commune, district, province, state) ▪ *Rescue operations*: the National Rescue and Fire-fighting System (the State Fire Service, Voluntary Fire Brigades)
Romania	Ministry of Waters and Environmental Protection	Ministry of Waters and Environmental Protection	▪ Ministry of Waters and Environmental Protection ▪ Ministry of Public Works, Transport and Housing	Ministry of Waters and Environmental Protection	▪ Ministry of Waters and Environmental Protection ▪ Ministry of Public Works, Transport and Housing
Slovak Republic	▪ Ministry of Environment of Slovak Republic, Water Protection Department ▪ Ministry of Interior of Slovak Republic, Office of Civil Defence ▪ Slovak Environmental Inspection ▪ Slovak Hydro Meteorological Institute	▪ Slovak Hydro Meteorological Institute ▪ Ministry of Interior of Slovak Republic, Office of Civil Defence	▪ Ministry of Environment of Slovak Republic, Department of Geology ▪ Geological Survey of Slovak Republic ▪ Ministry of Interior of Slovak Republic, Office of Civil Defense	▪ Ministry of Interior of Slovak Republic, Office of Civil Defence ▪ Ministry of Interior of Slovak Republic, Presidium of Fire Protection and Rescue Service	▪ Ministry of Environment of Slovak Republic, Department of Geology ▪ Geological Survey of Slovak Republic ▪ Ministry of Interior of Slovak Republic, Office of Civil Defence
Slovenia	*Prevention and remediation*: Ministry of the Environment, Spatial Planning and Energy *Preparedness and response*: Ministry of Defence, Administration for Civil Protection and Disaster Relief				

Table 4.5 (a): Principal Legislation

Natural Hazard / Country	Floods	Storms	Landslides	Forest Fires	Earthquakes
Bulgaria	The Constitution of the Republic of Bulgaria, Art. 16 concerning the obligation of citizens to help the Government and the municipality in case of natural or man-made disaster. The current Bulgarian legislation regulating the civil protection activities is based on the Council of State's Directive 265 of 1978, as well as the Rules on the Implementation of the Civil Defence Directive, promulgated in 1988 (amendments and addenda: 1990; 1999; 2001). The Law on the Administration, promulgated in 1998 (am. 2001) Art. 31 concerning the obligations of the local governors. The Law on Defence and Armed Forces of the Republic of Bulgaria promulgated in 1996 (am. 1996, 1998, 1999, 2000, 2001) Art. 6, item 15 concerning the protection of civilians in times of peace and war and Art. 54 concerning obligations of government institutions and their staff. The Law on Health and Safety Conditions of Labour, promulgated in 1997 (am. 2000, 2001) Art. 20, para.1. item 1, defining the obligations of employers in cases of disaster and their interaction with specialised civil defence and Fire Fighting Services. The Council of Ministers Enactment No 18 of 1998, Rules on organisation, prevention and mitigation of consequences of natural and technological disasters. The Council of Ministers Enactment No 53, dated 2 March 2001 (am. 15.10.2001; 14.12.2001) transforming the Civil Protection Service of the Republic of Bulgaria within the Ministry of Defence in State Agency for Civil Protection within the Council of Ministers.				
Czech Republic	Water Act No. 254/2001 Coll. Law No. 239/2000 Coll., on the Integrated Rescue System Law No. 240/2000 Coll., on Crisis Management	Law No. 239/2000 Coll., on the Integrated Rescue System Law No. 240/2000 Coll., on Crisis Management	Law No. 239/2000 Coll., on the Integrated Rescue System Law No. 240/2000 Coll., on Crisis Management	Law No. 239/2000 Coll., on the Integrated Rescue System Law No. 240/2000 Coll., on Crisis Management	Law No. 239/2000 Coll., on the Integrated Rescue System Law No. 240/2000 Coll., on Crisis Management
Estonia	Environmental Supervision Act Environmental Monitoring Act Emergency Preparedness Act	Environmental Supervision Act Environmental Monitoring Act Emergency Preparedness Act	Environmental Supervision Act Environmental Monitoring Act Emergency Preparedness Act	Environmental Supervision Act Environmental Monitoring Act Emergency Preparedness Act	Not applicable

Table 4.5 (b): Principal Legislation

Natural Hazard / Country	Floods	Storms	Landslides	Forest Fires	Earthquakes
Hungary	Act LXXIV of 1999 on the management and organisation for the prevention of disasters and the prevention of major accidents involving dangerous substances (Act on Disaster Management) Act LVII of 1995 on water economy Government Decree No. 232/1996 (XII.26.) on the rules of the defence against harm to waters Decree No. 10/1997 (VII.17.) KHVM on defence of flood and inland water [KHVM: Minister of Transport, Communication and Water]	Act LXXIV of 1999, The Act on Disaster Management Government Decree No. 179/1999 (XII.10.) on enforcement of Act LXXIV of 1999 on the management and organisation for the prevention of disasters and the prevention of major accidents involving dangerous substances There is no specific law.	Act LXXIV of 1999, The Act on Disaster Management Government Decree No. 179/1999 (XII.10.) on enforcement of Act LXXIV of 1999 on the management and organisation for the prevention of disasters and the prevention of major accidents involving dangerous substances There is no specific law.	Act LXXIV of 1999, The Act on Disaster Management Act LIV of 1996 on forests and defence of forests 53-57 § Decree No. 12/1997 (II.26.) BM on defence against fire [BM: Ministry of Interior]	Act LXXIV of 1999, The Act on Disaster Management Government Decree No. 179/1999 (XII.10.) on enforcement of Act LXXIV of 1999 on the management and organisation for the prevention of disasters and the prevention of major accidents involving dangerous substances There is no specific law.
Latvia	Civil Protection Law Law on Material Reserves Law on National Defence Fire Safety Law				
Lithuania	Law on Civil Protection of December 15, 1998 National plan on rescue operations and dealing with flood consequences in Klaipeda region, adopted by the Government on February 7, 2000	Law on Civil Protection No. 871 of December 15, 1998	Law on Self-Government No.I-533 of 7 July, 1994	Law on Fire Protection No. IX-1225 of 5 December, 2002 Law on Forests No.I-671 of 22 November, 1994 (new redaction of 22 October, 2002) Regulations on forest fire protection, adopted by the Government on 15 April, 1995	-

Table 4.5 (c): Principal Legislation

Natural Hazard / Country	Floods	Storms	Landslides	Forest Fires	Earthquakes
Poland	Water Act State of Disaster Act (during implementation) Fire Protection Act State Fire Service Act	Water Act State of Disaster Act (during implementation) Fire Protection Act State Fire Service Act	State of Disaster Act (during implementation) Fire Protection Act State Fire Service Act	Forests Act State of Disaster Act (during implementation) Fire Protection Act State Fire Service Act	Geology Act State of Disaster Act (during implementation) Fire Protection Act State Fire Service Act
Romania	Governmental Decision no. 209/1997 Governmental Decision no. 210/1997 Governmental Decision no. 638/1999	Law of Civil Protection no. 106/1996 Governmental Decision no. 210/1997 Governmental Decision no. 638/1999	Decision no. 438/1996 Law no. 75/2001 Order no. 62/N-19.0/288-1.955/1998	Governmental Decision -HG no. 1088/ 30.11.2000 Order no. 775/1998 Order no. 791/1998 Governmental Decision no. 678/1998	Law of defence against the disasters, no. 124/1995; Governmental Ordinance no 20/1994 Decision no 438/1996.
Slovak Republic	Act on Slovak Hydro Meteorological Institute - Year 1953 Act No. 42/1994 on civil safety Act No. 129/2002 on integrated rescue system Act No. 387/2002 on national emergency management	Act on Slovak Hydro Meteorological Institute - Year 1953 Act No. 42/1994 on civil safety Act No. 129/2002 on integrated rescue system Act No. 387/2002 on national emergency management	Act No. 42/1994 on civil safety Act No. 129/2002 on integrated rescue system Act No. 387/2002 on national emergency management	Act No. 42/1994 on civil safety Act No. 129/2002 on integrated rescue system Act No. 387/2002 on national emergency management	Act No. 42/1994 on civil safety Act No. 129/2002 on integrated rescue system Act No. 387/2002 on national emergency management

Table 4.5 (d): Principal Legislation

Natural Hazard / Country	Floods	Storms	Landslides	Forest Fires	Earthquakes
Slovenia	Land - Use Management Act (not yet published in the OJ RS, adopted by the Parliament on 29th Nov 2002) Act on the Protection Against Natural and Other Disasters (OJ RS 64/94, 33/2000, 87/2001). Water Act (OJ RS 67/2002) Act on ensuring means to cover intervention measures to limit the consequences of floods that affected Republic of Slovenia from September to November 1998 (OJ RS 86/98)	Act on the Protection Against Natural and Other Disasters (OJ RS 64/94, 33/2000, 87/2001) Act on ensuring means to limit the consequences of drought, storms, landslides and excreting mucus from the sea in 2000 (OJ RS 81/2000)	Land - Use Management Act (not yet published in the OJ RS, adopted by the Parliament on 29th Nov 2002) Water Act (OJ RS 67/2002) Act on the Protection Against Natural and Other Disasters (OJ RS 64/94, 33/2000, 87/2001). Act on measures to reduce the consequences of certain land-slides of major extent in 2000 and 2001 (OJ RS 21/2002)	Act on Fire Protection (OJ RS 71/93, 87/2001) Decree on Protection from Fire in a Natural Environment (OJ RS 62/95) Act on the Protection Against Natural and Other Disasters (OJ RS 64/94, 33/2000, 87/2001)	Land - Use Management Act (not yet published in OJ RS) adopted by Parliament 29/11/2002 Construction Act (not yet published in OJ RS, adopted by Parliament on 29/11/2002 2002) and construction regulations Act on the Protection Against Natural and Other Disasters (OJ RS 64/94, 33/2000, 87/2001). Act on the after-earthquake restoration and on the development stipulation at Posočje (OJ RS 45/1999)

4.4.3 Existence of Disaster and Climate Databases

In disaster management, databases are very important sources of information, in particular, taking into account the Lisbon European Council conclusions of March 2000, especially those that call for:

- efforts by public administrations at all levels to exploit new technologies to make information as accessible as possible; and
- Member States to provide generalised electronic access to main basic public services by 2003.

This exercise of information gathering in this area was carried out to identify what the state of the art is with regards to databases in Candidate Countries. This way, JRC efforts in the next phase of the PECO project can be targeted to assist Candidate Countries in their ongoing efforts to address the Lisbon Strategy in the field of disaster management.

Table 4.6: Existence of Disaster and Climate Databases

Database / Country	Disaster - National	Disaster - Regional	Disaster - Local	Climate – National	Climate - Regional	Climate - Local
Bulgaria	☑	☑	❑	☑	☑	❑
Czech Republic	☑	☑	❑	☑	❑	❑
Estonia	☑	☑	❑	☑	❑	❑
Hungary	❑	❑	❑	☑	❑	❑
Latvia						
Lithuania	❑	❑	❑	☑	❑	❑
Poland	☑	☑	☑	☑	❑	❑
Romania	☑	❑	❑	☑	❑	❑
Slovak Republic	☑	❑	❑	☑	❑	❑
Slovenia	☑	❑	☑	☑	❑	❑

☑	DB exists	❑	DB does not exist		No information obtained

From information provided by Candidate Countries in Table 4.6 (previous page), the following can be observed.

- In addition to having national DDBs, Bulgaria, Estonia and Poland have a disaster database (DDB) at regional level. Similarly, Slovenia and Poland also have DDBs at local level.
- Poland is the only country with DDBs at all administrative levels.
- All countries have climate databases (CDBs) at national level.

4.4.4 Flood Risk Management Plan and Maps[19]

For similar reasons as those mentioned in Section 4.3.3, information was sought regarding flood risk management plans and flood risk maps.

Table 4.7 (next page) demonstrates that most countries that provided information have flood risk management plans. Furthermore, all countries have flood risk maps. In some cases, flood risk maps can even be accessed on the Internet, as explained by the questionnaire compilers from the Slovak Republic and Slovenia. It can also be seen that most countries have flood risk maps in electronic format.

4.4.5 Application of Information Management and Risk-Based Screening Tools for the Management of Natural Hazards

Only a few countries appear to be applying risk-based screening tools in risk management of natural and technological hazards. Poland has been developing a decision support system for emergency response in case of chemical accidents (the SWAR system). Slovenia is in the process of building a system with risk-based decision support capabilities.

4.4.6 Risk Mapping of Other Natural Hazards

As much as possible, the JRC sought to learn about efforts in PECO countries to apply risk mapping and information management tools and systems to management of natural hazards. For the most part, the JRC utilised opportunities afforded by other project activities, such as the seminars and training meetings, to build its knowledge base. In some training meetings, the JRC staff were in fact treated to demonstrations of information management systems managing hazards data. However, resources for both the JRC and PECO countries for these areas of the project did not allow exploring the details of these systems. Nonetheless, the JRC learned enough to allow the formation of some preliminary conclusions about information management applications directed towards management of natural hazards in PECO countries.

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[19] Information was requested mainly on floods, as it is one of the most significant natural hazards that affects all Candidate Countries.

Table 4.7 (a): Existence of Flood Risk Management Plans and Maps

Detail / Country	Flood risk management plan	Flood risk maps	Comments
Bulgaria		☑	▪ They are available at a scale of 1:500,000
Czech Republic	☑	☑	The flood protection plans contain available data and information for flood protection of a structure, municipality, watercourse, river basin or other territorial unit. Individual bodies or organisations prepare the flood protection plans in the extent and structure relevant to their needs or in accordance with requirements specified by a flood protection authority. The basic hierarchical structure of the flood protection plans is formed by municipal flood protection plans (of municipalities whose territories are exposed to flood danger), district flood protection plans, river basin flood protection plans, and Flood Protection Plan of the Czech Republic, which is prepared by Ministry of Environment. If required by a flood protection authority or needed, the flood protection plans can also be prepared for individual properties that are exposed to flood danger. The plans contain factual and graphical parts, which includes relatively unchangeable information on sources of the flood danger, flood plain areas and flood protection measures. The operational part of the flood protection plans includes mainly contact information for individuals and organisations of the flood protection service. The flood protection plans are annually examined and if needed also amended. The factual parts of the flood protection plans are submitted for approval to pertinent flood protection authority or the authority at higher level. The operational parts are continuously updated and forwarded to flood protection authorities and other participants of the flood protection system. Digital flood risk maps are available.
Estonia	❑	☑	▪ They can be accessed at the Estonian Meteorological and Hydrological Institute. ▪ They are not available in electronic format.
Hungary	☑	☑	▪ They can be accessed via the Internet. ▪ They are available as DTA-50 base map scale ▪ They are mainly available in electronic format (ArcView and ArcInfo) and are regionally divided and stored in Oracle or MS SQL database.
Latvia	No information available		

☑	Item exists	❑	Item does not exist		No information obtained

Table 4.7 (b): Existence of Flood Risk Management Plans and Maps

Detail / Country	Flood risk management plan	Flood risk maps	Comments
Lithuania	☑	☑	▪ They are under development. ▪ They will be available in electronic format in future.
Poland	☑	☑	▪ They can be accessed at the Regional Boards of Water Management and State Fire Service Headquarters. ▪ They are available at a scale of 1:25,000 to 1:100,000. ▪ They are mainly available in traditional paper maps.
Romania	☑	☑	▪ In the Official Journal of Romania no. 726 (Monitorul Oficial al Romaniei) pag. no. 1 – 32, Bucharest, the Law regarding the "Plan of the national territory development, the Fifth Section – Areas of Natural Hazards", which includes risk maps of Romania for the areas prone to natural hazards (floods, landslides and earthquakes) and the exact geographical and administrative localisation of these areas including the indication of the risk level of producing the specific hazards.) (Law no. 575/2001). ▪ They are available at a scale of 1:1,000,000. ▪ They are available in *.pdf format. However, the Project "DEStructive WATer (DESWAT) – Abatement and Control of Water Disasters, an "Integrated Decisional – Informational System for Waters Emergencies" has been conceived to facilitate the production of detailed risk maps for areas prone to flooding, using GIS.
Slovak Republic	☑	☑	▪ They can be accessed at the following URLs: ▪ http://www.shmu.sk ▪ http://www.enviro.gov.sk ▪ http://www.uco.sk ▪ http://www.minv.sk ▪ They are available at a scale of 1:50,000. ▪ Competent authorities are investigating whether maps are available in electronic format (ArcView or ArcInfo).
Slovenia	☑	☑	▪ They can be accessed at the Administration for Civil Protection and Disaster Relief (http://www.mo-rs.si/urszr). ▪ They are available at a scale of 1:50,000 with flood lines: — T = 5 yrs (frequent floods) — T = 5-10 yrs (floods every 10-20 yrs) — T ≥ 50 yrs (catastrophic floods) ▪ They are available in electronic format, i.e., in ArcView.

☑	Item exists	❑	Item does not exist		No information obtained

Some of the countries appear to have mapped some hazards electronically. However, detail and completeness of this mapping is not known. The JRC did not gather enough information about information management applications in this area to make a judgement. In particular, several countries are concerned about the risk of one disaster event triggering another, particularly in the case of flood events. In the past three years two flood events have resulted in a chemical spill into water. In one case, the downstream consequences were severe and were the cause of transboundary pollution in a neighbouring country.

4.4.7 Flood Risk Management Process

The importance of thoroughly understanding the flood risk management process is very high. This is because every country has its own historical and cultural background that has influenced the development of the existing management process carried out in the country. In order to better dialogue and identify areas of co-operation, it is essential to fully understand disaster management mechanisms and actors in the different countries. Table 4.8 (pp. 104-109) offers a glimpse at the modus operandi of Candidate Countries when coping with inundation events.

Given that the degree of detail of information provided varies from one country to another, more information would be required in order to make a more accurate analysis of flood management processes,. However, the information already collected offers some insight into the emergency management procedures followed by these countries. It can also be observed that among the countries that have provided information regarding their national flood risk management process, the processes within each country are similar, although the actors may vary, and can be summarised as follows:

Generally, *before the event* the following actions are carried out:

- flood forecasting and warning systems are maintained;
- dissemination of information to the public;
- revision of emergency plans; and
- training of operational units.

Whilst, *during the event*, the following is carried out:

- securing of lifelines;
- rescue and evacuation of endangered population and providing assistance (medical care, accommodation, etc.);
- continuation of flood control measures; and
- ensuring updated information flow regarding the flood.

After the event, these are the activities envisaged:

- assessment of damages and calculating losses;
- restoration of "normal" conditions; and
- revision of legislation via incorporation of lessons learnt.

Table 4.8 (a): Flood Risk Management Process

Country	Flood Risk Management Process
Bulgaria	**Before** Everyday monitoring of data and forecasts regarding fluctuations of the river Danube are prepared by the National Unit for Monitoring and Forecasting on the Danube River. Notification about imminent disasters and instructions to the public on how to react are announced through Bulgarian television and radio and other mass media by a representative of the national government. The national government in co-ordination with the regional and municipal civil protection committees prepare the National Plan for handling emergencies in the face of potential disasters such as floods. **During** In case of a disaster, the affected regional or municipal civil protection committees initiate the detailed emergency plans and make recommendations to the Council of Ministers for declaring an emergency situation in the emergency or territory. Safety measures are also implemented in accordance with the national and regional emergency plans.
Czech Republic **(Pt. 1)**	**1. Preparedness measures and legislation** Generally, the flood protection measures in the Czech Republic can be divided into: preparatory measures, measures to be taken before floods, operating measures to be taken during floods and those implemented after a flood. The preparatory measures include the development of flood protection plans, performance of flood protection inspections, organisational and technical preparation of the flood protection measures, creation of flood reserve stock, clearing of flood plain areas, development of an information system, and training of personnel in flood protection activities. On the basis of a 1997 assessment of the potential for flood disaster and possible consequences, activities were launched aiming at the preparation of relevant legislation concerning flood protection, and to start special programs under relevant ministries, for defining areas vulnerable to flooding, for managing emergency situations, for restoring areas after flooding, and construction of flood protection structures. In 1999 the Czech Government Decree No. 100/1999 Coll. on protection against floods was issued. In 2000 the Resolution of the Czech Government No. 382 of 19 April 2000 was approved along with the document, "Strategy for Protection Against Floods in the Czech Republic". Finally, in June 2001, the Government adopted the new law, Water Law No. 254/2001 Coll. This law identifies specific flood protection measures to be taken. It also describes flood protection and management requirements in more detail, especially in relation to obligations of various authorities and other organisations. *1.1* ***Flood protection commissions*** Activities associated with flood protection are governed by specific flood protection authorities, and which belong to the national government. They are fully responsible for organising flood protection services in certain areas. The flood protection authorities govern, co-ordinate and control the activities of other participants involved in the flood protection. During a flood, the flood protection authorities consist of the flood protection commissions of municipalities, districts and basins, while during periods between floods, relevant responsibilities are undertaken by municipal authorities, district authorities and by the Ministry of Environment and the Central Flood Protection Commission of the Czech Republic. National authorities with flood protection responsiblities establish the flood protection commissions. Municipal flood protection commissions are also established for those municipalities that are vulnerable to flooding. During periods between floods, actions of flood protection authorities at regional and local level are subordinate to authorities at a higher level where they touch upon the national flood protection efforts. During a flood whose actual surface area exceeds the territorial responsibility of any one local or regional authority, or if the resources of this authority are insufficient for implementation of necessary measures, the responsibility for governing the flood protection activities is fully undertaken by a higher level authority.

Table 4.8 (b): Flood Risk Management Process

Country	Flood Risk Management Process
Czech Republic **(Pt. 2)**	1.2 ***Flood protection plans*** The flood protection plans contain available data and information for flood protection of a structure, municipality, watercourse, river basin or other territorial unit. Individual authorities or organisations prepare the flood protection plans in accordance with their needs or in accordance with requirements specified by a flood protection authority. The basic hierarchical structure of the flood protection plans is as follows: municipal flood protection plans (of municipalities whose territories are exposed to flood danger), district flood protection plans, river basin flood protection plans, and *Flood Protection Plan of the Czech Republic* (prepared by the Ministry of Environment). If requested by a flood protection authority, the flood protection plans can also be prepared for individual properties that are exposed to flood danger. The plans contain both written and graphic (spatial) information, including relatively fixed information on potential sources of flooding, location and definition of flood plain areas, and identification of flood protection measures. The operational part of the flood protection plans includes mainly contact information for individuals and organisations of the flood protection service. The flood protection plans are annually reviewed and amended (if necessary). The written portion of the flood protection plans is submitted for approval to the relevant flood protection authority or the authority at a higher level. The operational parts are continuously updated and forwarded to flood protection authorities and other participants of the flood protection system. 1.3 ***Level of flood protection activity*** The level of flood protection activity generally corresponds to the various phases of a flood event, that is, the state of the current emergency. The points at which particular state is declared, warranting and activating particular flood protection measures, are specified in flood protection plans and approved together with the plans by the flood protection authorities. Three levels of protection have been identified, corresponding to a particular level of flood danger as follows: • *Level one (state of alert)* - at water management structures, this level is active when limit values of observed variables or safety parameters of the structure have reached particular limit values or other signs of imminent flood danger resulting from human activity are detected. This level requires heightened attention to the watercourse or any other source of flood danger. Flood surveillance and reporting activities are also commenced at this time. The state of alert should also be reported by the Flood Forecasting Service of the Czech Hydro Meteorological Institute (CHMI). • *Level two (state of emergency)* is declared when the limit values of observed variables or safety parameters of a water management structure have been exceeded. The flood protection authorities and other participants responsible for flood protection are notified and relevant technical measures are undertaken. Flood mitigation actions as specified in the flood protection plans are also implemented at this time. • *Level three (state of danger)* is declared, simultaneously with the launching of emergency measures, when critical values of the observed variables or safety parameters of a water management structure have been attained. A state of danger is normally reported when water overflows riverbanks or when safety of a water management structure is endangered. Flood protection and, if required, rescue activities and evacuation are organised. **2. Response actions** The operating measures undertaken during a flood include flood forecasting, flood reporting and activation of the warning system, regulation of the flow regime, flood protection activities, rescue activities (evacuation), organisation of the transportation network, and other activities. The measures to be taken after a flood include assisting with efforts to resume normal activity interrupted by the flood in the affected territory, identification and evaluation of flood damages, elimination of the flood, and flood documentation and assessment. 2.1. ***Flood forecasting system*** The law has entrusted the flood forecasting and warning service to the CHMI in co-operation with the River Authorities. The CHMI established the Central Forecasting Office in Prague and six Regional Forecasting Offices in its subsidiaries. The main function of the meteorological service of the CHMI in the flood forecasting is monitoring and forecasting the weather and warning of dangerous weather events, in particular of heavy precipitation, storms, hail etc.

Table 4.8 (c): Flood Risk Management Process

<table>
<tr><th>Country</th><th>Flood Risk Management Process</th></tr>
<tr><td>Czech Republic

(Pt. 3)</td><td>2.2. Reporting and warning system

The hydrological service of the CHMI monitors the actual situation on rivers in the country via some 150 gauging stations which provide regular information together with data from the Water Management Centres of the River Authorities on the flow status of reservoirs, and data from the gauging stations networks. River Authorities play an important role in flood forecasting, early warning systems and flood protection measures in the basins in co-operation with CHMI. These reporting and warning systems are essential tools for flood preparation and protection at the national level within the Ministry of Environment.

2.3. Regulation of the flow regime

The River Authorities also operate and maintain watercourses, including regulation of the flow of water in various areas. During a flood the water management control units of the River Authorities are extremely active, as witnessed in the flood disaster of July 1997 and again in August 2002, particularly in controlling the location of runoff. However, the July 1997 and August 2002 floods were extraordinary to such a degree that the landscape retention capability was not adequate to eliminate it.

2.4. Rescue and emergency system

Activities of individual organisations within the flood protection system, which includes the national rescue and emergency system, depend on the type of flood and local conditions. Local rescue and emergency services are usually members of flood protection commissions. The central control of this system is vital as it feeds valuable information to the Ministry of Interior.

2.5. Restoration processes

With respect to the high level of damage associated with the 1997 and August 2002 floods, the Czech Government focused on improving central co-ordination of material and financial assistance for flooded areas. Therefore, it appointed the Minister of Environment as the representative for specification, co-ordination and implementation of a programme for restoration of areas affected by catastrophic floods. Responsibilities regarding restoration of flooded areas mainly entail the creation of necessary financial reserves, specification of priorities in allocating financial resources, and resolving questions in regard to the national contribution to flood damage compensation.

National legislation improved the financial budget and authorised the adoption of the above-mentioned systems.</td></tr>
<tr><td>Estonia</td><td>No information available</td></tr>
<tr><td>Hungary</td><td>Before
- The Hungarian Meteorological Service prepares special flood forecasts, which are generally available 12-24 hours before the beginning of heavy precipitation.
- KBIR [ESMS] System
During
- During the flood event the HMS give precipitation forecasts continuously
- KBIR [ESMS] System
- VIKAR [Water Quality Damage-Averting System]
After
- KBIR [ESMS] System
- VIKAR [Water Quality Damage-Averting System]</td></tr>
<tr><td>Latvia</td><td>No information available</td></tr>
<tr><td>Lithuania</td><td>Before
Preparedness stage – monitoring of water levels and prognosis on magnitude of the flood, checking of alarm and information systems, information of population about risks, work organisation of emergency management centres, reviewing of plans, preparedness of civil and rescue forces and system, preparation for other possible actions that will be required.
During
Operations stage – information of population and appropriate authorities about the situation, search and rescue operations, medical care, evacuation, ensuring of public order, securing of property, etc.
After
Recovery stage – recovery of utility services, recovery of damaged territories, identification of losses and other.
In all stages there is co-operation on support in flood management and information exchange between different levels of responsible institutions and emergency management centres. The national plan defines responsibilities of all involved institutions and municipalities.</td></tr>
</table>

Table 4.8 (d): Flood Risk Management Process

Country	Flood Risk Management Process
Poland	No information available
Romania **Pt. 1**	**Before** - The National Institute of Meteorology and Hydrology (Institutul National de Meteorologie si Hidrologie - INMH-SA) issues warnings to the competent authorities and the population regarding the large volume of precipitation forecasted, depending the case. - The Central Commission for Defence Against Floods, Dangerous Hydrometeorological Phenomena and Accidents at the hydrotechnical works (CCAI in Romanian) sends the hydrometeorological forecast elaborated by the CN INMH GA to the following organisations: General Secretariat of the Government, Permanent Technical Secretariat of the Governmental Commission for Defence Against Disasters, Ministry of Public Administration, all prefectures. - The hydrometeorological forecast includes, depending on the case, a "hydrological warning" concerning important increases of flows and water levels that will generate the exceeding of the protection elevations. - In the subsequent time period, the permanent technical secretariat (STP) of CCAI will receive daily meteorological and hydrological bulletins from CN INMH GA. In the bulletins information is presented on the hydrological situation of the rivers, along with a 24-hour forecast for the main hydrometric stations, a hydrological forecast of medium duration for the Danube (7 days) at its point of entry in Romania and for important points along the Romanian section of the river, including a description of the meteorological situation and 48-hour forecast. The Permanent Technical Secretariat also receives information from the Central Dispatcher's Office of the "Romanian Waters" National Administration. - CCAI requests an emergency meeting of the County Commissions for Defence in order to establish protection and intervention measures necessary in accordance with county emergency plans for defence against floods, dangerous hydrometeorological phenomena and accidents at the hydrotechnical works and then take the following measures: - After receiving the hydro-meteorological forecast, as required by the county emergency plans the County Commissions for Defence declare a state of emergency and organise surveillance at the local defence commission and commandment posts and at the dispatching units for the Water Management System; - The dispatching centres of the Water Management System maintain the flow of information and issue warnings.to the local commissions regarding flow levels. To forecast flooding in the upstream part of a reservoir catchment, the volume of water contained in snow layers is usually taken into account and converted into a preliminary discharge estimate,

Table 4.8 (e): Flood Risk Management Process

Country	Flood Risk Management Process
Romania **Pt. 2**	**During** - During the emergency, the Local Commissions for Defence will notify the County Commissions of Defence of the imminent danger, furnishing reports on the potential effects of the event, the damage that is likely to be caused, and protection measures that should be undertaken. At this time they may also request additional forces and other resources for the response effort. - On the basis of these reports, the permanent technical secretariats of the County Commissions will create a county-level report which is then sent to the permanent technical secretariats of the Governmental Commission of Defence and to the CCAI. - In conformance with the provisions of the Water Law no. 107/1996 and with the regulations for protection against floods, dangerous meteorological phenomena and accidents at hydrotechnical works, approved by the Government Decision no. 638/1999, actions during the flood should follow the procedures laid down in the emergency plans prepared by the counties in the country, or in the case of Bucharest, by the municipality. - The Local Commission for Defence, together with of the Ministry of Interior and Ministry of National Defence, depending on the situation, will organise the evacuation of the population, animals and valuables from the affected localities. - Accommodation is arranged for the evacuated population and medicines, medical assistance, food and mineral water are provided. - Targeted assistance is given to isolated villages. The Romanian Government offers humanitarian aid for all the evacuees. The medical-sanitary staff of the Public Health Directorates, along with the contribution of the family doctors and the representatives of the Red Cross, make an inventory of the houses with flooded wells and distribute disinfectants. An efforet is undertaken to warn the population about non-potable water. A permanent epidemiological and epizootic surveillance is also carried out to protect the population and animals against diseases in the affected localities. Fire fighter units pump the water from the basement of houses and flooded water wells. - The territorial units under the authority of the Ministry of Public Works, Transports and Housing, take actions with specific devices to clear away the roads and railways from affected counties. - The Permanent Technical Secretariat of the CCAI synthesises data and information regarding the evolution of the flood, its consequences, and protection measures undertaken. It also transmits reports to the Government and mass media, according to established procedure. **After** - After the cessation of the flood, the County Commissions of Defence draw up summary reports and transmit them to the Permanent Technical Secretariat of the CCAI. - The Permanent Technical Secretariat of CCAI jointly with the County Commissions of Defence are responsible for damage assessment, establishing appropriate measures to aid disaster victims, clean-up of damaged areas and removal of debris from the flood, and facilitating the resumption of normal activity in the affected counties. They also identify dikes that have been affected by the high water in fields and determine the funding necessary for their rehabilitation, make proposals to the Governmental Commission for additional material and financial resources necessary for future emergency situations involving hydrotechnical works.

Table 4.8 (f): Flood Risk Management Process

Country	Flood Risk Management Process
Slovak Republic	**Before** - Central Flood Commission - No. 135/1974 on government administration for water management - Central flood recovery staff - for floods at national level **During** - Central flood recovery staff - for floods at national level **After** - Central flood recovery staff - for floods at national level
Slovenia	**Before** National responsibility in addressing flood risk management before a flood event: a) The Ministry of the Environment, Spatial Planning and Energy defines policy of flood management and ensures that activities serving prevention from floods are also performed within the competent authorities. The competent authorities also implement extraordinary measures when there is a higher flood potential. Monitoring surface water and the weather, as well as forecasting, is the responsibility of the Meteorological Office of the Environmental Agency. b) The Ministry of Defence is the lead authority for managing preparedness at national level (floods of high magnitude). Its main tasks in this regard include the development of protection and rescue plans, organisation and training of intervention units, purchase of intervention equipment and management of the alarm system. The local authority's responsibility mainly lies in: - land-use planning (ensuring that hazards are taken into account); and - ensuring it is prepared to respond to floods of local consequence. National and local authorities responsible for preparedness meet regularly each year (usually at the Protection and Rescue Centre of the Republic of Slovenia). Meetings also take place whenever there is up-dated or new legislation. Each year in Slovenia one national and two to three local protection and rescue exercises are organised. These exercises also bring national and local authorities together to discuss lessons learned. National and local authorities also work closely together when developing local land-use plans. These plans must follow national land-use planning policy and should be harmonised with national plans. Note: There is no regional level in Slovenia.(only national and local). **During** Responsibilities, mode of operation and interaction between different authorities responsible for specific tasks during a flood event are defined in the local and national protection and rescue plans. Example: The tasks of the Ministry of the Environment, Spatial Planning and Energy - as defined in the national protection and rescue plan - include: - to ensure an adequate water supply; - to prepare documentation for the remediation of water courses and to supervise its execution; - to identify measures for handling dangerous substances; - to regulate interventions for environmental protection (clearance of rubble, restoration of facilities); - to determine locations for dumping the rubble, special waste and other types of debris; and - to define locations for temporary accommodation of evacuated persons, Tasks of other authorities, such as rescue forces and others that carry out activities during an emergency event are similarly defined. Co-ordination of all activities is the responsibility of the head of emergency services for the local or national commander of civil protection (depends on the magnitude of flooding). In exceptional circumstances certain decisions are taken by the Slovenian Government. **After** After a flood event local or national authorities asses the damage. Based on the damage assessments remediation plans are prepared. Restoration of the environment is performed according to these plans. The burden of ensuring financial means for restoration rests with the authority who owns the damaged infrastructure. After a flood event national and local authorities interact mainly to: - discuss lessons learned from the intervention; - review and revise legislation, level of preparedness; and - co-ordinate after-event restoration.

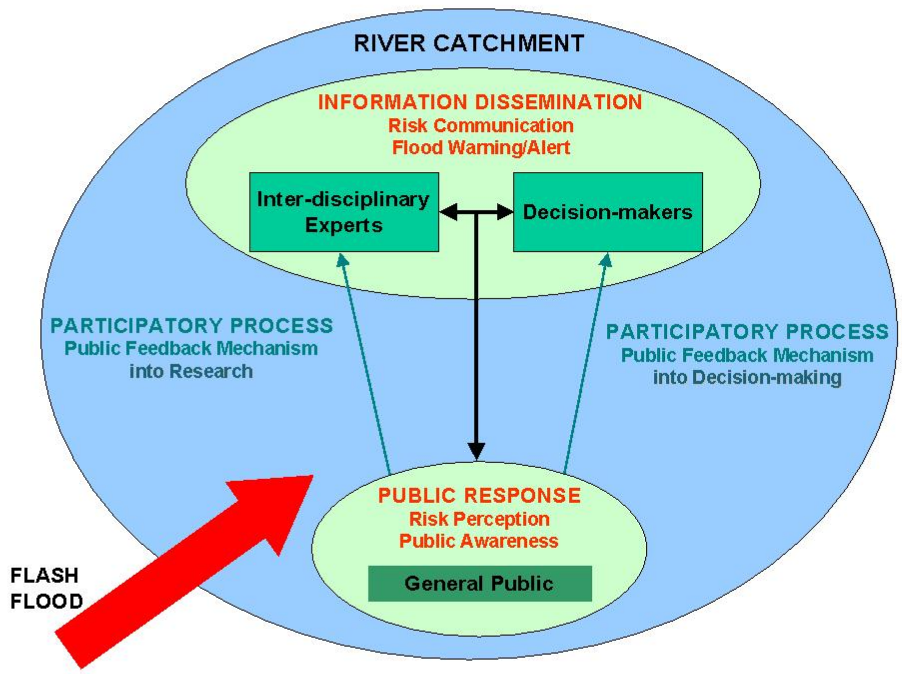


Figure 4.2: Information Flux, Public Response and Public Participation (Vetere Arellano, 2002)

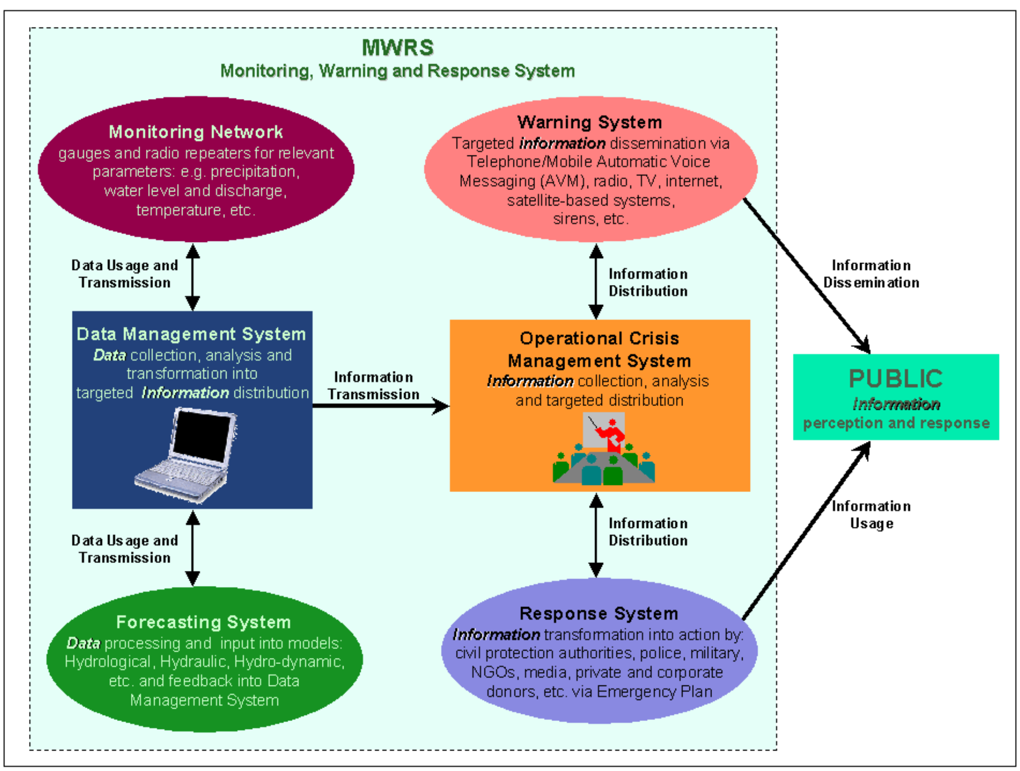


Figure 4.3: Scheme of an Information Flux in the Context of Disaster Management (Vetere Arellano, 2002)

4.4.8 Information Flux

Dissemination of information plays a very crucial role in disaster risk management. This can be portrayed by Figures 4.2 and 4.3[20]These figures describe the relevance of information dissemination amongst the actors involved in disaster risk management.

Tables 4.9 portrays the information provided by some Candidate Countries regarding the information flux in their country.

Table 4.9 (a) – Information Flux

Country	Process for Disseminating Information
Bulgaria	Information concerning earthquakes in Bulgaria, whether mild (tremors only) or serious (causing destruction) must be presented to the Civil Protection Authority (CPA) within 30 minutes of the event. The same information is also provided to the media which then broadcast it to the public. Information on local seismic activity is furnished weekly to the international seismological centres, such as the European-Mediterranean Seismological Centre and the U.S. National Earthquake Information Center. Meteorological information is provided weekly to the public via the mass media. Information on fluctuations of the river Danube are submitted to the interested authorities and to the public (via national radio) every afternoon around 15.00. There is generally a continuous flow of information between the regional branches of the CPA and headquarters. Similarly, the regional branches of MOEW exchange data on air and water pollution continuously with headquarters, and in case of emergency, immediately after observations have been registered.
Czech Republic	**Before the event** Quantitative Precipitation Forecast is one of the most important activities of the Czech Central Forecasting Office and is provided by way of quantitative modelling of the weather (the DWD, ALADIN or LAM Model) drawn from the reports of several European Meteorological Services (France, Germany, UK). This information is supplemented by data from the meteorological satellites and rain intensity maps provided by meteorological radar. The information is available on the web pages of CHMI (see: www.chmi.cz). During the event The flood forecasting and early warning system operates throughout the event. The hydrological service of CHMI monitors the actual situation on the rivers in the country via some 150 gauging stations which provide regular information together with data from the Water Management Centres of the River Authorities on the flow status within the reservoirs, and data from their gauging station networks. The information is also on the web pages of CHMI. Regulations on co-operation with the media were approved during the flood disaster of 1997. **After the event** After the 1997 flood, the Czech Government launched a project to establish a comprehensive record of the event, including a description and assessment of causal factors of a meteorological nature; flood hydrographs; extremes in regard to precipitation, peak flows and flood flow volumes, hydraulic conditions of outflows and overflows; effects associated with reservoirs and other water management structures; and the impact of the flood on the quality of surface and groundwater and their circulation. The output from the project also included an assessment of how the condition and use of land affected the flood's progression, and geographical information documenting the progression of the flood and its consequences. Video and film documents were produced to facilitate public awareness of flood risks and educate the public on flood protection measures. The geographical documentation of the flood's evolution has been used in a number of international projects, such as the project on hydrological modelling of flood hydrographs sponsored by Denmark. The affected population needs to be adequately informed and therefore, it is important to employ all of the available information systems, including the Internet, during a flood emergency. It is essential to check routinely that all participants of both the flood forecasting system and the reporting and warning system are connected to the information network. It is recommended that discussions are held with the public for the purposes of awareness and to garner support for planned flood protection measures.

[20] Taken from Alessandro G. Colombo, Javier Hervás and Ana Lisa Vetere Arellano. *NEDIES Project - Guidelines on Flash Flood Prevention and Mitigation* (pp. 64), Report EUR 20386 EN (2002).

Table 4.9 (b) – Information Flux

Country	Process for Disseminating Information
Estonia	The Estonian Meteorological and Hydrological Institute gives warnings about possible flooding through the media.
Hungary	There are on-line connections between decision-makers in the emergency services and the local Water Management Directorates, as well as telephone and fax connections. In extraordinary circumstances, the emergency broadcasting system is used.
Latvia	No information available
Lithuania	Information flows between all levels of emergency management centres and civil protection departments at national and county levels have been established as well as between responsible institutions.
Poland	No information available
Romania	- The Central Commission for Defence Against Floods, Dangerous Hydrometeorological Phenomena and Accidents at Hydrotechnical Works (CCAI), which works within the Ministry of Waters and Environment Protection and whose chairman is the Minister, is responsible at national level with organising and leading prevention and protection activities for flood protection. - The country prefect is the chairman of the County Commission for Defence, and the mayor is the chairman of the Local Commission of Defence. - The “Romanian Waters” National Administration (ANAR) performs technical co-ordination of flood protection activities within river basins through its territorial branches corresponding to the different river basins, in accordance with regulations governing high water flows in river basins and plans to protect against flood and ice floes in river basins. - Law no. 106/1996 - Law of Civil Defence established a network of stations for warning, notification and co-ordination, falling under the authority of the County Commissions for Defence and operated by the Civil Defence Inspectorates. - The National Institute of Meteorology and Hydrology (CN INMH GA) has the task of preparing forecasts and warnings concerning the generation of dangerous hydro-meteorological phenomena and of transmitting them to the following entities: • the permanent technical secretariat of the CCAI; • the dispatcher’s office of the “Romanian Waters” National Administration; and • the river basin branches. - These branches add detail to the forecasts received by the CN INMH GA based on information received from the Regional Meteorological Centres and from the radar system. Warnings are then transmitted to the County Commissions of Defence and their respectively warning stations. The County Commissions and the warning stations disseminate the information and the warning to the Local Commissions of Defence. - In conformance with Government Decision 210/1997, the Central Commission of Protection against Flooding has a Permanent Technical Secretariat seconded by a specialised division of the Ministry. The Permanent Technical Secretariat of the CCAI reviews the evolution of the meteorological and hydrological phenomena, verifies the transmission of forecasts and warnings, and makes reports to the Governmental Commission for Defence Against Disasters and to the mass-media. See Figure 4.4 (next page).
Slovak Republic	Water course map Anti-flood map preparation
Slovenia	See Figure 4.5.(next page).

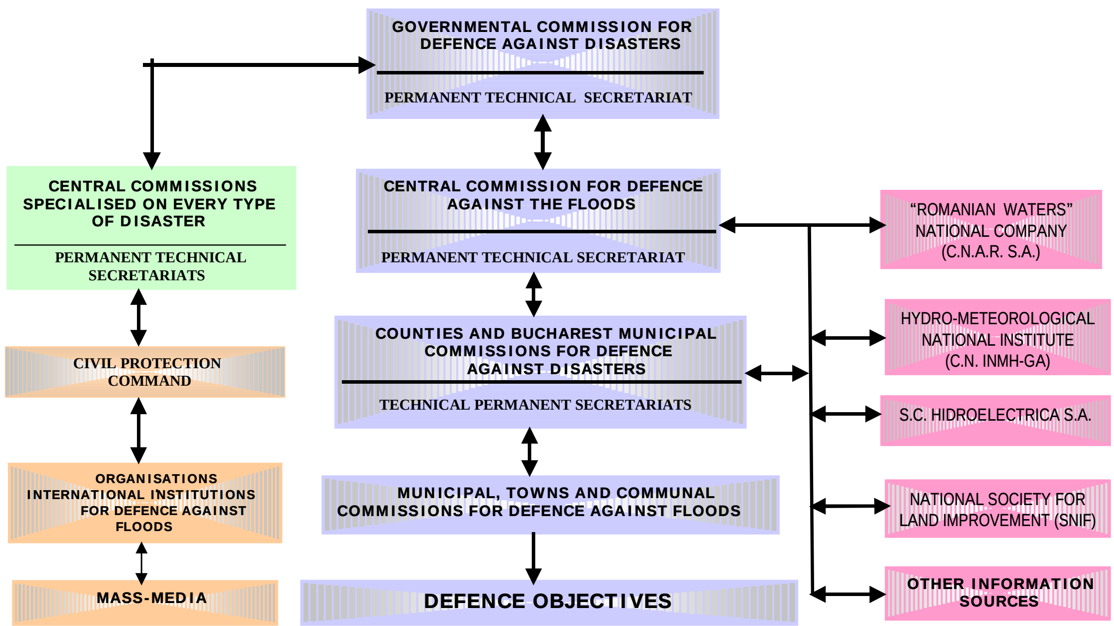


Figure 4.4: Scheme of the Informational-Decisional Flux for Defence Against Floods at National Level in Romania

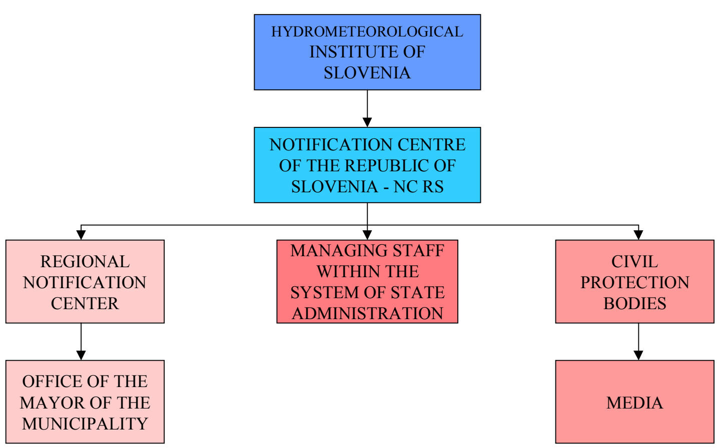


Figure 4.5: Scheme of Communication
Example from the National Protection and Rescue Plan for Floods in Slovenia.

4.4.9 Priorities and Needs

Table 4.10 describes the priorities and needs identified by some of the competent authorities in the field of natural hazards.

Table 4.10: Priorities and Needs for Natural Hazards in PECO Countries

Topic Area	Priorities/Needs
Natural Hazards	
Natural Hazards, Generally	▪ To implement a good emergency plan which covers prevention and response to all technological and natural hazards (BG) ▪ To develop and apply assessment tools to make decisions involving contaminated lands, oil-shale mining wastes and natural hazards (EST) ▪ To acquire general knowledge about natural disaster preparedness and response (BG) ▪ To develop an integral rescue and crisis management system in accordance with the National Calamities Act (PL) ▪ To prepare up-to-date assessments of threats from natural hazards (SLO)
Floods	▪ To improve the flood prevention infrastructure (BG) ▪ To improve the flood prevention infrastructure (CZ) ▪ To improve the flood prevention infrastructure (RO) ▪ To develop non-structural measures, e.g., improved legal and operational framework, for flood prevention and strategic intervention (RO) ▪ To improve early warning capabilities for storms and floods (RO) ▪ To implement the new anti-flood programme and associated flood control measures (SK) ▪ To conduct research to support implementation of the new anti-flood programme (SK)
Forest Fires	▪ To create good organisation measures to prevent and fight fires (BG) ▪ To improve risk assessment techniques to better anticipate the occurrence of forest fires (RO)
Landslides	▪ To implement improved landslide control measures (RO) ▪ To complete field studies of landslide areas (RO)
Earthquakes	▪ To identify communities and buildings that are critical in terms of emergency recovery and life safety in high risk seismic zones (RO) ▪ To select facilities for seismic risk mitigation funded by national and international projects (RO)

4.5 Conclusions and Recommendations

Almost all countries more than met expectations concerning the provision of information on natural hazards management and priorities in their jurisdictions. As also was expected, information received by the JRC varies in quality and quantity depending on the country and the natural hazard in question. Nonetheless, a minimum level of information was obtained for each country, and collectively, the JRC's understanding of natural hazard priorities, needs and capabilities was expanded as a result of the project.

To obtain a minimum level of new information, the JRC directed targeted requests for information to the PECO countries during the project, specifically for presentations on aspects of natural hazards management at the seminars and MARS/SPIRS training sessions, and for the completion of three questionnaires on natural hazards. All countries responded to at least one of those requests, and some countries to all of them. Responses were generally of high quality and often very thorough.

4.5.1 Conclusions

The following conclusions can be drawn from the project regarding natural hazards.

- Natural hazards strike in Candidate Countries in various shapes and sizes and request for assistance in addressing them has been made.
- Given the uniqueness of actors, organisational structure and natural disaster management processes in each Candidate Country, it is very important to obtain detailed information given the heterogeneity.
- The NEDIES expert meetings and workshops were very useful as they provided a platform for dialogue and exchange of lessons learnt and experience in the field of natural disaster management between the EU and Candidate Countries. With view to the Enlargement process, these meetings paved the way for close collaboration between the civil protection authorities of the present and forthcoming members of the EU.

However, it is also very important to note that the Candidate Countries have assisted the JRC in knowing more about:

- ✓ **Which** are the main natural hazards they are prone to;
- ✓ **What** are their needs, if any, for each natural hazard;
- ✓ **Who** are the main organisations active in natural disaster risk management;
- ✓ **How** natural hazards are managed in their countries.

This joint effort during the two-year duration the project will contribute towards better targeting the priorities and needs highlighted by the Candidate Countries. It will assist the JRC in finalising the strategy to pursue in the forthcoming Sixth Framework Programme in the field of natural disaster risk management in Central and Eastern Europe.

4.5.2 Recommendations

Given the information gathered on natural hazards management in PECO countries, the JRC believes that a number of future actions could be supported in the areas of risk and information management. These recommendations are listed in the following paragraphs. It should be noted that recommendations in this section are aimed primarily at future activities of the JRC, and there has been no attempt to make recommendations outside this framework.

- Continuation of knowledge gathering to help direct future Community actions. The JRC was able to confirm that there are a number of natural risks of high concern in Candidate Countries. Further interaction with Candidate Countries to learn more about approaches to managing these risks, and tools applied in managing these risks, could be of great value to current European initiatives in these areas. In particular, it could support actions to promote risk mapping and combined risk characterisation as outlined in the integrated EU strategy on emergency prevention and preparedness currently in development within DG-Environment. Additionally, such information could be of great value to current Community efforts to harmonise technical approaches and raise the level of risk management expertise in Europe.

- Risk mapping. The JRC is in a strong position to develop further co-operation with PECO Countries on risk mapping of natural hazards (along with some technological hazards). Some countries have already shared considerable information concerning both natural and technological risks and their own risk mapping efforts. There is an interest in some, if not all countries, in developing more comprehensive electronic maps for managing natural hazards and Community efforts in this area could build on this interest.

- Pilot projects in risk assessment of natural hazards. The natural hazards work in this project underscored the variation in the current objectives and perceived needs of each country's programme for managing particular natural risks. Given this variety, the JRC might attract and sustain successful collaboration with Candidate Countries if such projects could be tailored, as much as possible, to meet specific priorities and needs of each country.

  The pilot project approach offers a means to do so, by testing the benefits of particular approaches and tools applied to specific situations on a small scale. In particular, preparation and agreement to collaborate on pilot projects is generally achievable in a small time frame, particularly when strong working relationships have not yet been fully established between the parties. Such projects can also bring meaningful results to participants within a reasonable time period. As such, the pilot project model could be a mechanism for constructive collaboration with Candidate Countries for management of both natural and technological risks, and at the same time, contribute to the formation of possible future Community initiatives in this area.

Chapter 5 Other Technological Hazards and Integrated Risk Management

5.1 BACKGROUND

In addition to hazardous installations, there are numerous other hazards that have a technological basis. The JRC was interested in including both a range of natural hazards and technological hazards besides Seveso because of the complementarity of risk assessment and risk management needs that exists across these hazards. In addition, there is a growing recognition in the risk and emergency management communities of the need for integrated risk management in the context of a given geographical region. As noted in a recent DG-Environment publication, it has come to be understood that "the protection of people and of the environment is a complex issue that has to be tackled by an integrated approach."[21]

There are numerous types of technological hazards that are the source of disasters ranging anywhere from airplane crashes to tunnel accidents to marine oil spills. However, the JRC narrowed its focus to technological hazards with certain characteristics in common with hazardous installations. The Seveso Directive had already been designated as a driving force of the project and it was determined that other technological hazards would be addressed mainly in connection with integrated risk management. Therefore, a subset of technological hazards was selected for consideration within this project based on a strong linkage with Seveso hazards, that is, specifically, that the hazard originates in principal from the presence of hazardous substances within an activity associated with production, distribution and use of chemical and petroleum substances and products. The focus of this portion of the project was exclusively on identifying risk assessment needs existed and in particular where synergies existed in relation to other JRC risk assessment work.

5.2 PROJECT WORK PLAN FOR OTHER TECHNOLOGICAL HAZARDS

At the March 2001 seminar the PECO country representatives selected particular priorities among the technological hazards that the JRC proposed to include in the project. These were contaminated lands, oil shale mining, pipelines, transport of dangerous goods, and transboundary pollution through waterways. It was agreed at the meeting that PECO countries would probably not have the resources to devote significant resources to working with the JRC on these technological hazards, if resources were already committed to working on the Seveso and natural hazards part. As a result, the JRC limited its objectives to the following:

1. <u>Obtaining information on the importance of other technological hazards in each country and associated information management and assessment needs.</u> Because of other resource demands of the project, no specific activity was

[21] "An Integrated EU Strategy on Prevention, Preparedness and Response to Natural, Man-Made and Other Risks". Document prepared for the First Meeting on the Preparation of a Communication on an Integrated European Union strategy on Prevention, Preparedness and Response to Natural, Man-Made and Other Risks. 11 December 2002. Brussels, Belgium.

designed to specifically address this objective. This object was assigned low-level resources in the expectation that it could be integrated with other activities of the project.

2. Exploring interest and opportunities within PECO countries for incorporating assessment of technological hazards into tools aimed to assist with integrated risk management. This objective was also designed to be a low resource activity but as a slightly higher priority activity than the first objective. Achieving the objective did not solely depend on information gained through objective one, but could independently be served through discussion with experts in the individual countries.

5.2.1 Information Collected on Other Technological Hazards

The lower emphasis placed on other technological hazards within the project meant that JRC had to accept that less detailed would be gathered on these hazards than other hazards included in the project. In particular the JRC was conscious of the advantages and disadvantages of different participants in terms of their ability to provide information on other technological hazards. Some countries provided considerable information, partly usually because they had a stronger interest in the subject. Some country representatives on the project also had responsibilities related to other technological hazards or had regular contacts with colleagues working in these areas. However, for other project participants, technological hazards did not figure into their everyday responsibilities and contact with experts in those fields was not regular.

The JRC first solicited information on technological hazards other than Seveso at the March 2001 seminar and the seminar was successful in soliciting some detailed information from a few countries on this topic. Information was also obtained at the MARS/SPIRS training meetings, through the Risk Relevance Survey, and at the final seminar in November 2002. The JRC specifically placed discussion of needs associated with other technological hazards as part of the training meeting agenda and a list of questions was prepared. The JRC received a good portion of information on technological hazards from PECO countries in this way, particularly from countries that had not previously provided it. A few countries also took advantage of the final seminar to contribute additional information on other technological hazards.

5.2.2 Exploration of Opportunities for Developing and Applying Risk Management Tools

The JRC explored interest and opportunities within PECO countries for working with risk-based screening and decisions support tools for integrated risk management in two ways: 1) through exposing the PECO countries to different types of tools, developed or in development at the JRC; and 2) through interactions with countries through the various training meetings and seminars. The JRC also was prepared to examine the possibility of immediate collaboration with any country if a potential opportunity arose over the course of the project and its strong interest in finding such projects was communicated clearly to countries, especially during the MARS/SPIRS training meetings. Through these meetings, two potential opportunities were presented with Slovenia and Estonia that were subsequently discussed in bilateral meetings with these countries in Ispra.

5.3 ACTIVITIES AND ACCOMPLISHMENTS

The JRC succeeded in obtaining critical information about interest and expertise available in PECO countries for developing information management tools to supporting decision-making in the management of natural and technological hazards. Specific activities and accomplishments within this area of the work plan include:

Distribution of ARIPAR software. It was determined that the ARIPAR software tool might also be useful to efforts in the PECO Countries, to assess industrial risks within particular localities or regions. The software tool allows users to perform a quantitative assessment of the risks connected with processing, storage and transportation of dangerous substances in industrial areas, according to the ARIPAR methodology. Given strong interest expressed by a number of countries, the JRC decided to translate the software in English for general use in the PECO Countries and ideally the EU Member States as well. This software tool was distributed in pilot form to all PECO countries in October 2002.

Demonstration of JRC information management tools. Over the course of the project, the JRC completed, or was in the process of completing the development of a number of different risk-based screening tools and decision support systems. The JRC took advantage of opportunities within the project to expose the PECO countries to these instruments, and more generally, to integrated management of various risks, as a way of stimulating and exploring interest in applying such tools. In particular, all the tools were part of a hands-on demonstration session at the November 2001 seminar.

The PECO countries were provided with demonstrations on the following information management systems and tools during the project (in addition to the MARS/SPIRS and ARIPAR softwares mentioned in Chapter 3):

> <u>CommonGIS.</u> *CommonGIS* envisions the dissemination and exploitation of geographically referenced data (henceforth called geo-data) to a broad cross-section of the public. Geo-data encompass various thematic or statistical data on demography, economy, education, culture, and history. The key-thought of CommonGIS is to make geo-data commonly accessible and usable for everyone, from everywhere, by providing a WWW-based Geographical Information System (GIS) with specific functions for the automatic generation of thematic maps.
>
> <u>HARIA 2.</u> The output of the HARIA-2 project is a set of models and tools for the analysis and optimization of emergency plans, accident scenario simulation (UNI-PI) and a GIS-based tool for emergency simulation (JRC). Its aim is to model and simulate dynamic systems interacting during a severe accident in chemical and petrochemical industries, including physical systems, civil protection systems, rescue services and resources available for consequence mitigation. Accidents that can be analysed through HARIA-2 include accidents that could impact the surrounding environment, territorial

and social systems, populations and other targets that could be affected by the accident.

SIMAGE. The objective of the SIMAGE information management system is the design, realisation and implementation of cost-effective, operating, lasting integrated systems in highly industrialised areas for monitoring and management of environmental emergencies related to industrial accident and air quality. It provides makes a number of databases and modelling tools available for assessing particular emergency situations in the framework of one information management system. A joint project with Italian authorities, it is also intended to be used for information exchange concerning industrial risk, air, water, soil, networked with the major existing Italian risk areas, and the planning and management of emergencies associated with industrial accidents or transportation of dangerous goods.

By demonstrating these tools at the seminar, the JRC hoped to stimulate interest in the application of information management tools to assist with risk decision-making. CommonGIS, ARIPAR (in pilot form) and HARIA-2 (in pilot form) were actually tools that the JRC could make immediately available for exploitation by PECO countries. SIMAGE, on the other hand, is a product specifically tailored to meet the needs of a particular client and is, in addition, a complex information management system rather than a software tool. Nonetheless, the JRC felt it would be useful to demonstrate SIMAGE so that PECO countries could have a better grasp of the how the information management technology can be harnessed in the service of risk management. Moreover, the JRC has specific knowledge that it would be willing to contribute should a PECO country be interested in incorporating some aspects of the SIMAGE system into its own system.

In addition, the JRC also was interested in working with the PECO countries to apply these tools in collaborative projects on risk assessment, including possibly integrated risk assessment, with PECO countries. Exposure to these tools would help the PECO countries form their own ideas about what kinds of applications could be of use in their overall risk management strategies. These ideas could then be used to define bi-lateral or multi-lateral projects that could be performed jointly with PECO countries in the 6th Framework Programme.

As a result of these efforts, the JRC appears to have created particular interest in the ARIPAR software tool. Subsequent to the workshop, several countries followed up with requests for assistance in making the software operative and also for additional copies of the software. This interest has opened up the possibility of incorporating this software in further collaborative work related to risk assessment, which would, as a beneficial side effect, enhance the ability of different PECO country experts to use ARIPAR effectively.

Technical Exchange on Information Systems for Managing Risk Information with Slovenia and Estonia. Through the MARS/SPIRS training meetings, the JRC found that Estonia and Slovenia had some interest in elaborating a current information management system with elements related to technological and natural hazards. As a result, the JRC set up separate bi-lateral meetings with each country, in part, as a simple contribution of knowledge to their efforts. Each country was interested in learning about JRC's experiences in creating information management systems. This knowledge would be useful to similar work taking place or planned in their countries. The JRC was similarly interested in knowing more about the work of the Slovenian and Estonian experts, understanding the capabilities of their systems, and establishing a dialogue that could lead to future technical exchange and possible collaboration in future.

Estonia. In the meeting with Estonia, Estonia provided information on new legislation establishing an Environmental Register in Estonia that will require data relative to the state of the natural environment and associated risks to be centralised at the national level. The law requires the development of a system for standardising, relating and processing the Environmental Register data. The Estonian Ministry of Environment is preparing to develop such an information management system starting sometime in late 2003. The JRC described a number of the information management tools, including CommonGIS and ARIPAR, which it had developed or was developing. The JRC provided some information on lessons learned from experience in creating such systems and discussed various options that Estonia could consider to achieve its objectives.

Estonia also expressed interest in applying CommonGIS to visualise various data elements. Subsequently, the JRC has applied CommonGIS to a sample spatial data set provided by Estonia and is awaiting feedback from Estonia on the results.

Slovenia. Slovenia is in the process of elaborating its information management system, called GIS-UJMA, used to support management of natural and other disasters for the Administration for Civil Protection and Disaster Relief. The system has been planned so that it satisfies the needs of both the operational staff in notification centres and of emergency and land-use planners. Construction of the system is ongoing and Slovenia was interested in learning about JRC's experiences in creating information management systems as an input to its own work. The JRC was similarly interested in knowing more about the work of the Slovenian experts and understanding the capabilities of the GIS-UJMA system.

Collection of lessons learnt from road transport accidents. Within the framework of the NEDIES Project, Bulgaria and Romania took part in the NEDIES Lessons Learnt expert meeting on road transport accidents held in Ispra, Italy between 12-13 September 2002. Information on three road accidents was submitted (two from Romania and one from Bulgaria).

5.4 PROJECT FINDINGS

As a result of ongoing efforts to collect information for the project, the JRC was able to create a general picture concerning the presence of the different priority technological hazards in each country. A few countries provided considerably more detail and this information is also highlighted in this section.

5.4.1 General Overview of Other Technological Hazards in PECO Countries

Information gathered during the project confirmed to a large degree the selection of the priorities for other technological hazards at the March 2001 seminar. As shown in Table 5.1 (next page), among the five priority hazards covered in the project,

Table 5.1: Estimates[a] of Risk Relevance per Country for Technological Hazards Other than Seveso

Country	Contaminated Lands	Oil Shale Mining	Pipelines	Transport of Dangerous Goods	Transboundary pollution
Bulgaria	Low	Low	Medium	High	Medium
Czech Republic	High	Low	Medium	High	Medium
Estonia	Low	Low	Low	Low	Low
Hungary	Medium	Low	Medium	High	High
Latvia	Low	na	Medium	High	High
Lithuania	Low	Low	Low	Medium	Low
Poland	Medium	Low	Medium	High	Medium
Romania	Medium	na	Medium	Medium	Medium
Slovakia	High	Low	Low	Low	Medium
Slovenia	Low	Low	Low	Medium	Medium

High[b]
Medium
Low
na Not applicable

[a] Important: These estimates are based on perceptions of representatives of the competent authorities working within the project. As such, they represent only indications of relevant importance of certain hazards in each country, and are intended to be treated as rough estimates only.

b See Table 2.1, p. 40, for definition of these categories.

transport of dangerous goods and transboundary pollution was of medium or high relevance to the most countries. In fact, five countries identified transportation of dangerous goods as a hazard of high relevance. Contaminated lands were of high or medium relevance to six countries and six countries rated pipelines as of medium relevance.

Oil-shale mining that had been originally included in the group was not noted as of a medium or high relevance in any country. Estonia had originally introduced this hazard into the list of priorities in the March 2001 seminar. It also ranked oil-shale mining as of low relevance; however, in relative terms this hazard is likely to continue to be a high priority for them.

A country by country description of the most relevant hazards is provided in Table 5.2 on the next page.

Priorities and Needs Related to Other Technological Hazards and Integrated Risk Management

Table 5.3 (on page 124) shows the priorities and needs related to other technological hazards and integrated risk management as identified by the PECO countries at the March 2001 seminar and in response to the Risk Relevance Survey of November

Table 5.2: Summary Description of Other Priority Technological Hazards

Country	Summary Description of Other Priority Technological Hazards
Bulgaria	Bulgaria identified transport of dangerous goods as a risk of high relevance[22] to the country, and pipelines and transboundary pollution through water courses as a medium risk. It was noted that transboundary effects of pollution, both through air and water courses, was currently a politically sensitive issue. Transboundary pollution concerns were related in particular with the mining industry and downstream effects on the Danube and Timok River, and with ammonium transported by air from the city of Nikopol's fertiliser plant across the border in the Ukraine.
Czech Republic	The Czech Republic named contaminated lands, inherited from the pre-1989 political and economic system, and transport of dangerous goods by road as of medium relevance. The Czech Republic is particular concerned about the possibility that improvements to the road infrastructure currently underway could augment risks associated with the transport of dangerous goods in future. Pipelines were also identified as of medium relevance.
Estonia	Contaminated lands left over from the pre-1989 political era are a concern for Estonia. Oil shale mining also represents an important technological hazard in Estonia because of toxic and flammable properties associated with fuel stocks.
Hungary	A centrally located country in Europe, transport of dangerous goods is of high relevance to the country. Of medium relevance are contaminated lands and pipelines.
Latvia	Important technological hazards in Latvia are all directly related to the role that Latvia has long played in the transport of goods through the region. Latvia is situated at an intersection of trade routes and has long served as a bridge between Western Europe and Russia. Latvia recorded 65 chemical accidents associated with hazardous installations, pipelines and the transport of dangerous goods (by sea, rail and road) in the year 2000, most of them involving fuel and petroleum products. Transboundary pollution (air and water) from installations just over the Lithuanian border were also noted as a concern. Latvia also has inherited contaminated lands from military occupation in the Soviet era.
Lithuania	Lithuania identified transport of dangerous goods as of medium relevance to the country. Lithuania has a modern highway system and a major ice-free seaport, and therefore figures significantly in the transport of goods between nearby countries and regions. Pipelines also play a role in the transport of goods across the country, but are not considered as high a risk as transport of dangerous goods and hazardous installations. Transboundary pollution is also perceived as of medium importance in Lithuania.
Poland	Transport of dangerous goods is considered a risk of very high relevance to Poland. In the year 2000, Poland recorded 186 accidents as "extraordinary hazards to the environment"; a little over half occurred in transportation and the remainder originated in fixed installations. Transboundary pollution was identified as a risk of medium relevance; Major parts of its river basins are in the border areas and there are fixed installations in the border area that are a potential threat to transboundary water. With a few exceptions, fixed installations in border area are sources of hazards endangering mostly transboundary water. Contaminated lands (from military occupation in the Soviet era) and pipelines are also of medium concern.
Romania	Romania identified several technological hazards as medium relevance to the country, including hazardous installations, contaminated lands, pipelines, transport of dangerous goods and transboundary pollution. Romania is a Party to the Danube River Convention and is active in maintaining a monitoring and early warning system for notifying other riparian states of potential transboundary effects of a local incident.
Slovakia	Slovakia identified risks from hazardous installations and from contaminated lands as of high relevance to the country. Slovakia has committed significant resources to the assessment of contaminated lands that are left over from military sites of the former Soviet regime.
Slovenia	Slovenia marked hazardous installations, transport of dangerous goods and transboundary pollution as hazards of medium relevance to the country. Slovenia recorded 395 accidents involving dangerous substances, and 130 of these occurred in transport.

[22] See Table 2.1 on page 40 for definition of "high", "medium" and "low" relevance.

Table 5.3: Priorities and Needs Identified for Other Technological Hazards and Integrated Risk Assessment and Management

Contaminated lands	▪ To assess and clean up contaminated lands (BG) ▪ To develop and apply assessment tools to make decisions involving contaminated lands, oil-shale mining, wastes and natural hazards (EST) ▪ To obtain the necessary financial resources to address the problem of contaminated lands (LV) ▪ To develop and apply appropriate methodologies for risk assessment of contaminated lands (LV) ▪ To acquire necessary analytical equipment and technology for monitoring and analysing contaminated lands (LV)
Oil-shale Mining Waste	▪ To develop and apply assessment tools to make decisions involving contaminated lands, oil-shale mining wastes and natural hazards (EST)
Pipelines	▪ Not mentioned
Transport of Dangerous Goods	▪ To prevent and limit accidents occurring through the transport of dangerous goods, especially road transport (BG) ▪ To reduce risk posed by transportation of dangerous goods (H) ▪ To develop risk assessment tools for the prevention of transport accidents (H)
Transboundary Pollution	▪ To elaborate and implement measures to limit transboundary pollution (BG) ▪ To obtain equipment for adequately monitoring pollution (LV) ▪ To improve monitoring of the surface waters in Hungary and maintain good quality (H) ▪ To implement the decisions of the Conference of the Parties for the UNECE Convention on the Transboundary Effects of Industrial Accidents (H)
Information Management	▪ To complete development of an information management system for managing industrial accident prevention and response (LT) ▪ To develop an industrial accident information system (H) ▪ To develop modern computer, information and communication tools for supporting rescue and crisis management (PL) ▪ To review and revise the information management system for disaster emergencies (SL)
Integrated Risk Assessment and Management	▪ To implement a good emergency plan which covers prevention and response to all technological and natural hazards (BG) ▪ To develop an integral rescue and crisis management system in accordance with the National Calamities Act (PL) ▪ To improve the emergency decision-making system (SLO)

2002. The information details particular areas of interest relative to specific hazards. Notably, three countries emphasised an interest in applying risk assessment methodologies to assist in management of contaminated lands. Oil shale mining, transport of dangerous goods and transboundary pollution are all mentioned at least once, but pipelines was not included in the description of priorities and needs of any country.

Three countries (Bulgaria, Poland and Slovenia) specifically expressed a strong interest in developing the capability to analyse a situation involving multiple risks. Information management needs described by Poland and Slovenia also appeared to reflect this interest. Indeed, the in-depth discussions with Slovenia confirm that it is headed in the direction of integrated risk management with its emergency management system.

Natech risks (natural disasters triggering technological disasters) were specifically mentioned in connection with flood and transboundary pollution hazards by the Czech Republic, Poland, Romania and Slovakia. The Baia Mare incident, in which 100.000 tonnes of cyanide contaminated the Danube and several tributaries of the Danube in 2000, involved 3 types of disaster events, flooding, chemical release from a hazardous installation, and transboundary pollution. Consequences of this disaster included a massive fish kill and contamination of surface water in a portion of Hungary. Flooding in the Czech Republic in 2002 resulted in a chemical release at a hazardous installation that, if not contained, could also have had transboundary pollution effects.

5.4.2 Other Technological Hazards in Latvia and Poland

The JRC received very detailed descriptions of other technological hazards in Latvia and Poland. Because this is useful information for possible future Commission work in these areas, this information is summarised in the paragraphs that follow.

Latvia

Latvia provided a detailed description of its problems with contaminated lands, transport of dangerous goods and pipelines, including data to illustrate the variety of risk situations and the frequency of their occurrence.

Database on accidental pollution of the environment. Data provided by Latvia on chemical accidents in fixed installations, in transport and in pipelines was extracted from Latvia's Database of Accidental Pollution of the Environment, managed by the Latvian Environment Agency. The database includes the following information about each accident:

- date, time and location of the accident;
- name of the operator, or establishment ,or guilty party;
- pollutants (substances, or category of substances, or preparations);
- polluted territory and amounts of polluted soil and water;
- the potential impact on human health and the environment, if known
- the suspected cause of the accident;
- the damages and measures taken to limit consequences, including clean-up; and
- the administrative or other sanctions, if taken.

In the year 2000, the database recorded 65 accidents involving dangerous substances. Of these accidents, eleven (11) occurred in fixed facilities, fifteen (15) were oil spills during sea transport, and sixteen (16) involved inland transport, either road or railway. The records showed that fifty (50) of the accidents involved spills of oil or oil related products, including diesel and petrol, five (5) accidents resulted from the release of untreated sewage or waste waters, and five incidents involving other chemicals, such as chlorine and ammonia.

Contaminated lands. Studies on environmental pollution caused by the Russian Army were initiated in Latvia in 1992. Latvia hosted Soviet Army military units and bases of differing scales and purposes, which occupied approximately 100.000 hectares or 1.5% of Latvia's territory. The most serious environmental and economic damage was caused by the former Soviet Army's military firing grounds, airfields, rocket bases, filling-stations, fuel depots and naval ports. A joint Latvian and Norwegian project was arranged to identify environmental damage and problems with former military sites. According to the study, of 255 former military sites, fourteen were identified as having evidence of contamination threatening to humans or the environment. For seventeen sites, dangerous contamination levels were suspected but could not be verified. For the remaining sites, either there appeared to be a low risk of migration or there was no evidence of pollution or hazardous materials.

Poland

Poland provided documentation that summarised the nature and extent of risks associated with contaminated lands, pipelines, and transport of dangerous goods in the country.

Contaminated lands. Poland has catalogued twenty-one (21) contaminated lands that comprise total of 59.828,3 hectares, which is nearly 2% of its territory. The damage is located within areas that formerly formed part of former Soviet military bases. The mostly soil and ground water contamination by petroleum products. On fifteen (15) sites, a layer of fuel has been found floating on the surface of groundwater or on the roof of the non-permeable layer. The depth of the fuel layer ranges between a thin "film" and 5,0 m and the combined total area of contaminated layers discovered is 90 hectares. The volume of the floating fuel amounts to about 95.000 m^3. The estimated cost to clean up the damage is approximately € 12,2 billion (52,2 billion PLN).

Transport of dangerous goods, pipelines. Major European east-west transportation routes traverse Poland, including roads, railways and pipelines. After 1989 Poland experienced a significant increase of inland and cross-country traffic. In particular, the current intensity of traffic exceeds the design capacity of border crossing points and related facilities.

Poland estimates that approximate million units of transport carrying dangerous goods travel along its roads every year. The risk posed by this volume is augmented when the bad road conditions along many routes is taken into consideration. Moreover, Poland’s efforts to monitor the transport of dangerous materials on the roadways is limited.

Approximately, 244.000 domestic and 6.000 foreign tank carriages, composing 350.000 trains of hazardous materials travel across Poland’s railways on an annual basis. Of these materials, 700.000 tonnes are extremely hazardous substances.

Poland’s extensive pipeline network is used to transfer petroleum, petroleum products and gas to export markets (for domestic use), to transfer product from Russia to Western Europe, and to transfer product internally. Poland gave an example of one company alone that transferred an estimated 27 million tonnes of petroleum per year from Russia to Germany across Polish territory.

5.5 Conclusions and Recommendations

The JRC did not explore the area of other technological hazards or integrated risk management as fully as other parts of the project. However, the information that was obtained still leads to some useful conclusions and recommendations.

5.5.1 Conclusions

- Moderate to risk associated with transport of dangerous goods and transboundary pollution. Representatives from eight out of ten countries consider transport of dangerous goods and transboundary pollution moderate to very important risks in their country. Pipelines and contaminated lands were also rated as of moderate to high relevance in six countries. Contaminated lands are another hazard that is common to several PECO countries. Six countries rated contaminated lands as of medium or high relevance and three countries expressed a strong interest in developing and applying risk assessment methodologies and tools to improve management of this hazard.

  Several countries also mentioned the presence of pipeline as of medium relevance, although specific priorities in this area were not well-defined.

- Tools for information management and risk assessment. Information management tools that support management and analysis of data for multiple hazards are of interest to some countries. Estonia has just adopted legislation that requires the development of a comprehensive data management system that will hold all official data relative to natural resources and the environment, including the presence of major hazards. Slovenia has already developed a spatial database that covers the major hazards of the country and is planning to incorporate programmes that provide analysis across hazards to support emergency response planning and prevention. Poland also intends to build a system that will address needs related to multiple hazards as part of implementation of its Natural Calamities Act.

  In particular, several countries are concerned about the risk of one disaster event triggering another, particularly in the case of flood events. In the past three years two flood events have resulted in a chemical spill into water. In one case, the downstream consequences were severe and were the cause of transboundary pollution in a neighbouring country. These events have stimulated strong interest in improving forecasting abilities that may lead to better prevention of these types of disasters.

- Use of risk-based screening tools. Only a few countries appear to be applying risk-based screening tools in risk management of natural and technological hazards. For example, Poland has been developing and applying risk-based screening tools, including an application of the IAEA methodology and a decision support system for emergency response in case of chemical accidents (the SWAR system). Other countries, such as Hungary and Czech Republic, also appear to be applying or moving towards application of such tools.

5.5.2 Recommendations

Recommendations in this section are aimed primarily at future activities of the JRC, and there has been no attempt to make recommendations outside this framework.

Given that PECO countries share certain priorities related to other technological hazards, the JRC believes that it is worthwhile to explore further the possibility of supporting risk management of these hazards.

- Information tools for data management and analysis. Specifically, the JRC could consider applying its expertise to support in the context of information management tools that could support data management or data analysis across hazards, including certain technological hazards, but also natural hazards alone, as the case may be. Therefore, in future, it seems worthwhile for the JRC to continue to support the PECO countries by distributing and supporting the application of the tools it has already developed in this regard.

- Risk assessment and information systems. It also could be beneficial for the JRC to continue to offer its expertise in risk assessment and information systems for building expertise in this area in PECO countries. Bi-lateral or multi-lateral collaborative work with PECO countries in this area could also lead to general advancement of research and technology efforts in the field of risk management and civil protection, in accordance with the integrated EU strategy on emergency prevention and preparedness in development within DG-Environment.
- Application of risk assessment methodologies to contaminated lands. Given the interest in applying risk assessment to contaminated lands, the JRC could consider developing a project to test applications of various risk assessment methodologies in this field. It could draw on the modeling expertise already available in the JRC and experiences and knowledge gained through development of the European Soil Information System (EUSIS).
- Harmonisation of mapping procedures and standards. Working with Candidate Countries in testing and applying JRC's GIS-based mapping tool could also contribute to the harmonisation of procedures and standards related to risk assessment and mapping of natural and technological disasters within these countries.

ANNEX 1: COUNTRY PROFILES

BULGARIA

Area	110,993 km^2
Population	8 million
Population Density	72 inhabitants/per km^2

Geography and Climate. Bulgaria is situated in the southeastern part of mainland Europe. It is bound in the east by the Black Sea; in the north by the River Danube and Romania; in the south by Turkey and Greece and in the west by the Federal Republic of Yugoslavia and Macedonia. It is therefore strategically located at the crossroads between Northern and Southern Europe and between Europe and Asia. Bulgaria's varied topography includes fertile plains and thickly wooded mountain ranges. The vast lowlands of the Danube plains dominate the North and in the south there are highlands and elevated plains. Along the Black Sea coast there are 130 km of vast beaches. Bulgaria has a moderate continental climate with average annual temperatures of 10.5° C. There is a marked Mediterranean influence in the climate in the southern parts of the country.

Bulgaria is the third largest country in terms of area, but only half the size of Romania, the second largest of the PECO countries. In comparison to the other countries, it is populated only to a moderate extent.

Technological Hazards. Bulgaria has an estimated 67 hazardous installations that will qualify for coverage under the Seveso II Directive. In addition, it identified transport of dangerous goods as a risk of high relevance to the country, and pipelines and transboundary pollution through water courses as a medium risk. It was noted that transboundary effects of pollution, both through air and water courses, is currently a politically sensitive issue. Transboundary pollution concerns are related in particular with the mining industry and downstream effects on the Danube and Timok River, and with ammonium transported by air from the city of Nikopol’s fertiliser plant across the border in the Ukraine.

Natural Hazards. Bulgaria stated that forest fires and earthquakes were hazards of high relevance to the country; floods and landslides were recorded as of medium relevance. Recent disasters affecting localised areas of Bulgaria include earthquakes (1977 and 1986), catastrophic floods (occurring several times during the 1990s) and landslides along the Black Sea coast in 1997.

Priorities and Needs. Bulgaria listed its priorities as follows:

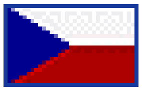
- developing a good program for industrial risk assessment and management;
- create a good organisational measures to prevent and fight forest fires;
- to elaborate and implement measures to limit transboundary pollution; and
- prepare and implement a good emergency plan, which covers prevention and response to all technological and natural hazards.

Its needs were defined as:

- Methodologies for risk assessment;

- Training in Seveso issues /assessing documentation, performing inspections etc./ for the local inspectors and for the staff in the Ministry of Environment and Water;
- Methodology for prevention and limitation of accidents through transport of dangerous goods, especially road transport; and
- Some general knowledge about natural disaster preparedness and response.

CZECH REPUBLIC



Area	78,866 km^2
Population	10.3 million
Population Density	131 inhabitants per km^2

Geography and Climate. The Czech Republic is landlocked with a varied topography including mountains in western Bohemia. The largest river is the Vlatava which runs through Prague. It stretches 326 km from the Baltic and 322 km from the Adriatic. It shares borders with Germany (810 km), Poland (762 km), Austria (466 km) and Slovakia (265 km). The highest point of elevation is the peak of Mt. Snezka (1 602 m above sea level) and the lowest point of elevation is near Hrensko where the River Labe leaves Czech territory (117 m above sea level). The climate in the Czech Republic is seasonally variable, with the normal summer temperature ranging from 23º C to 29º C and the normal winter ones between -11ºC and 0ºC. Temperatures are lower in the mountainous regions.

The Czech Republic has the highest population density among the PECO countries.

Technological Hazards. The Czech Republic has 132 hazardous installations that are covered under the Seveso II Directive and hazardous installations were noted to be of medium priority in the country. In addition, contaminated lands, transport of dangerous goods, pipelines were identified as of medium priority.

Natural Hazards. Although floods were assigned a high priority, storms remain a medium priority in the Czech Republic. Storms were also considered of medium relevance to the Czech Republic, with a number of windstorms, hailstorms and downpours that can damage agricultural production and forests. Forest fires are also of medium relevance to the country.

Priorities and Needs. For technological hazards, the Czech Republic named assessment and clean up of contaminated lands, inherited from the pre-1989 political and economic system, and transport of dangerous goods by road. The Czech Republic is particular concerned about the possibility that improvements to the road infrastructure currently underway could affect transport of dangerous goods in future. Flooding was identified as the highest priority among natural hazards following the flood disaster of August 2002. Improvements to the flood prevention infrastructure were cited as a particular need in this area.

ESTONIA

Area	45,227 km^2
Population	1.4 million
Population Density	30 inhabitants per km^2

Geography and Climate. Estonia is the smallest and the northernmost of the Baltic States (about the same size as Denmark) and is sparsely populated. Sweden is Estonia's western neighbour across the Baltic. Russia lies to the east, Latvia to the south, and its coastline runs along the Baltic Sea and the Gulf of Finland. The country is mostly flat, with many lakes and islands although in the south there are rolling hills. There are over 1.500 islands in Estonia's territorial waters.

It has a climate of icy, snowy winters and long light summers. Average temperatures range from 18.8º C in summer (July is the hottest month) to -1.9º C in winter.

Technological Hazards. Estonia has an estimated 28 hazardous installations that will be covered under the Seveso II Directive. A good number of these installations are warehouses located in port areas. Contaminated lands left over from the pre-1989 political era are also a concern for Estonia. Oil shale mining also represents an important technological hazard in Estonia because of toxic and flammable properties associated with fuel stocks.

Natural Hazards. Forest fires are an ongoing concern in Estonia and are considered to be of medium relevance to the country. Storms were also identified to be of medium relevance. The annual number of severe storms that occur each year in Estonia appears to be rising slightly.

Priorities and Needs. Technological and natural hazards are topics of less general relevance to Estonia than other PECO countries. This circumstance may be in part due to a lower population density and lower activity in comparison with other countries of the region. Within these hazard categories, Estonia provided detail that indicated that some hazards were of more concern others. Natural hazards dominate Estonia’s risk priorities and the potential for forest fires is chief among these. The chief concern within technological hazards is oil-shale mining, as noted above. The Estonian authorities are interested in applying risk assessment tools to make decisions involving contaminated lands, oil-shale mining waste, and natural hazards, primarily floods and forest fires.

HUNGARY

Area	93,030 km²
Population	10.2 million
Population Density	108 inhabitants per km^2

Geography and Climate. Hungary is a landlocked country in Central Europe, bounded on the north by Slovakia; on the north-east by Ukraine; on the east by Romania; on the south by Serbia, Croatia, and Slovenia; and on the west by Austria. Its maximum extent from west to east is 528 km; from north to south this figure is 319 km. Hungary is predominantly flat. The Danube River forms part of Hungary's north-western border with Slovakia, and then flows south through Budapest, dividing Hungary into two general regions. A low, rolling plain known as the Great Hungarian Plain, covers most of the region east of the Danube extending east to Romania and south to Serbia. Highlands along the northern border of the country extend eastward from the gorge of the Danube at Esztergom and include the Matra Mountains, a part of the Carpathian Mountain system.

Hungary has a temperate climate typical of Central Europe. The average yearly variations in temperature range from -3º C in January to 26º C in July.

Technological Hazards. Hungary has an estimated 126 Seveso installations. A centrally located country in Europe, transport of dangerous goods is of high relevance to the country. Of medium relevance are contaminated lands and pipelines.

Natural Hazards. Hungary identified floods as the highest priority natural hazard in the project. Hungary has experienced six major flood events since 1995, five of which affected the Tisa River and one involving the Danube.

Priorities and Needs. Hungary identified Seveso II Directive implementation as a priority among technological hazards. Transport of dangerous goods and transboundary pollution from water courses were also identified as of high importance. Ninety-five percent of the country's surface waters arrives from abroad. The direct effect of catastrophic pollution of rivers can last for many days or even many weeks, and can be spread over many hundreds of kilometres. The water quality status of the river Duna and the Hungarian lakes is carefully monitored on an ongoing basis.

LATVIA

Area	64,589 km²
Population	2.4 million
Population Density	37 inhabitants per km^2

Geography and Climate. Latvia is located in north-eastern Europe on the Baltic Sea. It borders with Estonia, Russia, Belarus and Lithuania. Its coastline is 500 km long. The distance from north to south is 210 km and from east to west is 450 km. The landscape is marked by lowland plains and rolling hills. Most of the territory is less than 100 metres above sea level. Forests cover more than 40 percent of the country.

Latvia's weather is temperate. The average summer temperature is 18º C, the average winter temperature -5º C.

In comparison to the other PECO countries, Latvia's size and population density are relatively low. It is only slightly larger in population and area than Estonia, the lowest ranked country in these categories

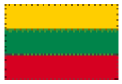
Technological Hazards. Important technological hazards in Latvia are all directly related to the role that Latvia has long played in the transport of goods through the region. Latvia has an estimated 44 hazardous installations that qualify for coverage under Seveso II. Latvia is situated at an intersection of trade routes and has long served as a bridge between Western Europe and Russia. Hazardous installations of most concern are generally storage facilities in port areas. Latvia recorded 65 chemical accidents associated with hazardous installations, pipelines and the transport of dangerous goods (by sea, rail and road) in the year 2000, most of them involving fuel and petroleum products. (However, of those occurring in hazardous installations, none would have met the Seveso criteria for a major accident.) Transboundary pollution (air and water) from installations just over the Lithuanian border were also noted as a concern.

Latvia also shares (with other eastern and central European countries) the inheritance of contaminated lands from military occupation in the Soviet era.

Natural Hazards. Forest fires and floods were identified as hazards of medium relevance in Latvia. In contrast, earthquakes and landslides rarely, if ever, occur and have almost no relevance at all in the country.

Priorities and Needs. Latvia's highest priorities are dominated by technological hazards and were identified as chemical installations, including processing and storage, transportation of dangerous goods and transboundary pollution. Latvia identified pollution monitoring and emergency response equipment as an ongoing need for adequately monitoring pollution and responding to technological disasters. Latvia also indicated that it lacks financial resources to address the problem of contaminated lands on old military sites in a comprehensive fashion. In particular, the country has not identified a common methodology for assessing the risks at each site. More training in laboratory analysis and technological equipment to support such analyses, and risk assessment of contaminated lands in general, is also lacking.

LITHUANIA



Area	65,300 km²
Population	3.5 million
Population Density	57 inhabitants per km²

Geography and Climate. Lithuania covers an area of 65.300 sq. km making it the largest of the three Baltic States. It is bordered by Latvia, Belarus, Poland and Russia. To the west it borders the Baltic Sea along a 99 km coastline. Lithuania has more than 2.800 lakes, which occupy 1.5% of the territory, and 772 rivers run through the country. 70% of Lithuanian territory is arable land and 27.6% is forest.

The climate is midway between maritime and continental, with an average daytime temperature of -5º C in January and 23º C in July. Annual precipitation is around 65 cm.

Technological Hazards. Lithuania estimates that there are approximately 26 hazardous installations that will be covered under Seveso II. Lithuania also identified transport of dangerous goods as of medium relevance to the country. Lithuania has a modern highway system and a major ice-free seaport, and therefore figures significantly in the transport of goods between nearby countries and regions. Pipelines also play a role in the transport of goods across the country, but are not considered as high a risk as transport of dangerous goods and hazardous installations. Transboundary pollution is also perceived as of medium importance in Lithuania.

Natural Hazards. Lithuania rated floods, storms and forest fires as risks of medium relevance to Lithuania. Earthquakes occur rarely, if ever, and are not considered relevant.

Priorities and Needs. Lithuania listed preparedness for and prevention of chemical accidents as a current top priority. It seeks to augment its capacity prevent and manage chemical accidents, in particular:

- information management before and during an accident;
- training of specialists and response units;
- emergency management detection and support systems; and
- risk assessment and evaluation methods, and accident consequences prognosis models.

POLAND

Area	312,685 km²
Population	38.6 million
Population Density	123 inhabitants per km^2

Geography and Climate. Poland is the largest country of the ten Peco countries, with the highest population and the second highest population density. It is bordered by Germany, Russia, Belarus, Ukraine, Lithuania, Czech Republic and Slovak Republic. To the north it borders the Baltic Sea. Most of the country lies less than 200 metres above sea level although to the south it is bordered by the Carpathian mountain range. The highest peak Rysy is 2.500 meters. The country is fertile and is traversed by large and slow-moving rivers such as the Vistula and the Bug.

Poland has a temperate climate with seasonal variations between -5º C in winter and 18º C in summer. In the mountains to the south of the country and in the northern lake area the extremes of temperature are more pronounced.

Technological Hazards. Transport of dangerous goods is considered a risk of very high relevance to Poland. Major European east-west transportation routes traverse Poland, including roads, railways and pipelines. Poland has the most Seveso installations of any country with an estimated 285 Seveso installations. Risk to Poland from hazardous installations was indicated to be of medium relevance. In the year 2000, Poland recorded 186 accidents as “extraordinary hazards to the environment”; a little over half occurred in transportation and the remainder originated in fixed installations.

Transboundary pollution was identified as a risk of medium relevance; Major parts of its river basins are in the border areas and there are fixed installations in the border area that are a potential threat to transboundary water.

Contaminated lands (from military occupation in the Soviet era) and pipelines are also of medium concern.

Natural Hazards. Floods and forest fires were marked as hazards of high relevance to Poland. Flooding of the rivers Oder and Neisse caused 55 fatalities and the evacuation of 200.000 people in 1997.

Priorities and Needs. Poland cited the following priorities in relation to management of natural and technological hazards at the end of 2002:

- full implementation of the Seveso II Directive;
- ratification of the Convention on the Transboundary Effects of Industrial Accidents; and
- development of an integral rescue and crisis management system in accordance with the Polish Natural Calamities Act; and
- In relation to these priorities, it highlighted the need to develop modern computer, information and communication tools for supporting rescue and crisis management.

ROMANIA

Area	238,391 km²
Population	22.4 million
Population Density	94 inhabitants per km^2

Geography and Climate. Situated in south-eastern central Europe, Romania covers 238.391 sq km. The Black Sea forms the south-eastern border and the river Danube forms the southern border with Bulgaria. To the north and east lie Ukraine and Moldova, respectively, and to the west Yugoslavia and Hungary. The Carpathian Mountains run north-south, almost as far as Bucharest, before turning west. There are fertile plains, gentle hills, prime agricultural land, and numerous vineyards.

Romania's climate is temperate continental, with cold winters and hot summers, and often with short springs and autumns. The Black Sea coastal area enjoys mild winters and cool summers.

Romania is the second largest PECO country in terms of both size and population.

Technological Hazards. Romania identified several technological hazards as medium relevance to the country, including hazardous installations, contaminated lands, pipelines, transport of dangerous goods and transboundary pollution. Romania is a Party to the Danube River Convention and is active in maintaining a monitoring and early warning system for notifying other riparian states of potential transboundary effects of a local incident. Romania has an estimated 202 Seveso installations.

Natural Hazards. Romania highlighted floods, storms, landslides and earthquakes as of high importance. It has several projects underway to improve preparedness for and prevention of these disasters. Notably, Romania is in the process of installing DOPPLER radars to complete its National Integrated Meteorological System (SIMIN) and will have the capability of providing more advance and precise warning about potential flood and storm events. Because of the population's exposure to a variety of natural risks, Romania is also placing emphasis on information to the public in the view that such knowledge will reinforce prevention and preparedness capabilities.

Priorities and Needs. Natural hazards dominate current priorities among technological and natural hazards in Romania, notably floods, storms, forest fires and earthquakes. Specific needs to support natural hazards management include:

- structural measures to develop hydrotechnical infrastructure for controlling floods and providing adequate flood warning;
- non-structural measures, i.e., improved legislative and operational framework, for flood prevention and strategic intervention to minimise flood effects;
- landslide control measures including land-use planning and improved information to the public;
- completion of field studies of landslide areas to assess land characteristics for designing appropriate technical controls;
- risk assessment to better anticipate the occurrence of forest fires;
- improved control measures to reduce the occurrence of forest fires;
- improved information to the public on the prevention of forest fires;

- identification of communities and buildings in high risk seismic zones to target infrastructure improvements and enhanced emergency preparedness; and
- enhancement of early warning capability in regard to storms

Specific needs to support technological hazards include:

- The adoption and implementation of the acquis communautaire regarding environment protection are difficult due to their inter-sector character and to the implications that this sector has within the entire Romanian industry, but also due to compliance with European quality standards which involves significant costs and structural changes concerning the entire economy of the country.

- An overall assessment of costs necessary to comply with community legislation (legislative aspects, the setting up and development of an institutional structure in order to implement, monitor and control the new legislation) has come to € 10 billion.

SLOVAKIA

Area	49,035 km²
Population	5.4 million
Population Density	108 inhabitants per km^2

Geography and Climate. The Slovak Republic is a landlocked country with mountainous terrain to the north and central areas and lowlands in the south. Most of the country is rugged and mountainous; the Tatra Mountains in the north are interspersed with many scenic lakes and valleys. The Czech Republic, Poland, Austria, Hungary and Ukraine all border Slovakia.

Slovakia's climate is characterised by hot summers and cold, humid winters. Temperatures range from 0º C in January to 36º C in July and August though winter temperatures in the mountains can be 10º C less.

The Slovak Republic is one of the smaller countries with about the same amount of area as Estonia but carrying three times the population. It has the third highest density among the ten countries along with Hungary.

Technological Hazards. Slovakia identified risks from hazardous installations and from contaminated lands as of high relevance to the country. The Slovak Republic has an estimated 120 installations qualifying under the Seveso II Directive.

Natural Hazards. Slovakia marked all natural hazards in the project as of medium relevant to the country. However, flood risks were highlighted because of recent flood events in 1999 and 2000. Slovakia suffered damages from the catastrophic flooding that occurred in eastern and central Europe in the summer of 2002. However, flood damages in the country were far worse in 1999, with rescue operations and property damage costing well over €100 million.

Priorities and Needs. The "Anti-Flood Protection Programme of the Slovak Republic by 2010" approved by the Resolution of the Slovakian Government No. 31 from 19 January 2000 has become the basis for Slovakia's anti-flood policy and strategy. The "Set of Scientific-Technical Projects" (STP) is also part of this legislation. It consists of nine partial scientific-technical projects and aims to address both the breadth and complexity of anti-flood protection. It envisions that many protective measures will need to be supported by research.

SLOVENIA

Area	20,273 km²
Population	2 million
Population Density	95 inhabitants per km^2

Geography and Climate. Slovenia is bordered with Austria to the North, Hungary to the north-east, Croatia to the south-east and Italy and the Adriatic Sea (47 km of coastline) towards the west. The main port is Koper. Slovenia is intersected by a number of small rivers. The rivers are not navigable. The country is predominantly mountainous with the highest peak Triglav at 2.864 metres. Slovenia is by far the smallest of the Peco countries, and has a lower population than any country but Estonia. However, its density is three times that of Estonia and it ranks fifth among the Peco countries for that indicator.

Slovenia enjoys three different climatic zones. The coastal region has a typically Mediterranean climate with mild winters. The centre and north-west are influenced by the Alps and have longer colder winters and fairly warm summers. The remainder of the country has a continental European climate.

Technological Hazards. Slovenia marked hazardous installations, transport of dangerous goods and transboundary pollution as hazards of medium relevance to the country. Slovenia recorded 395 accidents involving dangerous substances and 130 of these occurred in transport. Slovenia estimated that 34 hazardous installations would qualify for coverage under the Seveso II Directive.

Natural Hazards. Slovenia indicated that floods and earthquakes are of high relevance and landslides and forest fires are of medium relevance. Various parts of the country are affected by one or more of these kinds of natural disasters each year. Slovenia recorded 3 major periods in which floods and landslides were prevalent in 2000 and 14 forest fires covering over 10 hectares were also noted.

Priorities and Needs. In the area of technological hazards, priorities in Slovenia are currently focused risk management of hazardous installations and the transport of dangerous goods. Exposed to a number of natural risks, Slovenia's priorities in this area pertain more generally to improving risk management and emergency response. Specific needs were identified as:

- improving knowledge in the area of hazard and risk management;
- ensuring that industrial hazards are taken into account in land-use planning policies, and that appropriate methodologies and criteria are defined;
- the improvement of inspections and report of accidents under Seveso II;
- the introduction of a system to monitor the transport of dangerous goods via a GPS system;
- improving the emergency decision-making system;
- reviewing and revising the information management system for disaster emergencies
- assuring that emergency response teams are adequately organised, trained and equipped; and
- preparing up-to-date assessments of threats from natural hazards.

ANNEX 2: REFERENCES

The information in this report was developed as a result of a number of project activities as follows:

Seminars and Meetings

A substantial amount of information about natural and technological hazards as well as Seveso implementation was exchanged through meetings and seminars held over the course of this project, including:

- Disaster forms submitted by Candidate Countries to the NEDIES online reporting system on natural disasters and accidents occurring in the EU and Candidate Countries.
- Interviews and presentations from SPIRS training sessions conducted by the JRC's Major Accident Hazards Bureau (Institute for the Protection and Security of the Citizen) from September 2001 through March 2002 in Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia. Presentations and in-depth discussion of Seveso implementation, with a focus on hazardous installations data, implementation progress and risk assessment. Training sessions also included presentations and a more general discussion of the current status of information management and risk assessment tools in the management of other natural and technological hazards.
- Seminar on "Lessons Learnt from Flood Disasters" sponsored by the NEDIES Project. European Commission. Joint Research Centre. Ispra (Italy). 27-28 September 2001.
- Seminar on "Lessons Learnt from Forest Fire Disasters" sponsored by the NEDIES Project. European Commission. Joint Research Centre. Ispra (Italy). 23-24 May 2002.
- Seminar on "Lessons Learnt from Landslide Disasters" sponsored by the NEDIES Project. European Commission. Joint Research Centre. Ispra (Italy). 14-15 March 2002.
- Seminar on "Lessons Learnt regarding Dissemination of Information" sponsored by the NEDIES Project. European Commission. Joint Research Centre. Ispra (Italy). 24-25 June 2002.
- Seminar on "Natural and Technological Hazards in PECO Countries", Presentations prepared by each PECO Country on natural and technological hazard priorities and related data and information management activities. European Commission. Joint Research Centre, Ispra (Italy), 14-16 March 2001.
- Seminar on "Project Achievements and Future", held as part of JRC Enlargement Project PA No. 26, "Management of Natural and Technological Hazards". Presentations from each country on future priority actions relative to the use of information management and risk assessment tools for management of natural and technological hazards. European Commission. Joint Research Centre. Ispra (Italy). 10-13 November 2002.

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Responses to Project Surveys

- General Questionnaire on Disaster Databases and Flood Management Processes Distributed October 2002.
- SPIRS Questionnaire. The survey asked for information on hazardous installations data and data management systems maintained in each country. Distributed July 2001.
- Survey on Risk Relevance of Selected Natural and Technological Hazards for each country. The survey requested project focal points (representatives of participating competent authorities) to categorise the ten Priority Natural and Technological Hazards (as identified within the project) as “low”, “medium” or “high” priority, according to given criteria. The survey also requested countries to list needs/priority actions for natural and technological hazards in the country. Distributed October 2002.
- Tables of Lead Competent Authorities and Legislation covering natural disasters Each country was asked to provide information to complete these tables accurately. Distributed October 2002.
- Tables on Seveso Implementation Activity and Legislation. Each country was asked to provide information to help complete these tables accurately. Distributed December 2002.

Other documents

To complete this report, the JRC also referred to other documentation provided by the countries over the course of this project.

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Mission of the JRC

The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.

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