1 Risk assessment: practical lessons within the European Union

In this brochure you will learn about the practical experiences of seven public institutions in six EU member states with the mitigation of spatial relevant risks. This first of three brochures deals with the initial step of the mitigation process: risk assessment. The total process will be described in the MiSRaR-handbook, meant for professionals and political decision makers in all EU member states.

Risks within the European Union

The daily life of European citizens is threatened by many natural and *man-made* safety risks. Natural disasters, small and large, like forest fires, floods and landslides, are a yearly recurring phenomenon within the European Union. The occurrence of other natural disasters like earthquakes and volcanic eruptions is less frequent, but in the long term very likely and with potential catastrophic consequences. Also technological risks are ever present. Incidents with the production, usage, storage and transport of hazardous materials pose a significant risk for all EU member states.

Local, regional and national governments within the EU bear responsibility for optimal protection of European citizens against physical safety and security risks. To support this the EU has implemented several guidelines, such as the SEVESO-II guideline (96/82/EG)[1] on external safety risks of industries dealing with hazardous substances and the guideline on flood risks (2007/60/EG)[2]. For the years 2007 to 2013 the European Commission considers the prevention of external safety risks one of the main policy priorities. This is a logical choice. The last years the economic damage due to disasters and major incidents within the EU has increased considerably. Explanation is not only the higher number of occurrences, but also the greater economical value of the affected territories.[3] Moreover, due to the expected climate change the probability and economical impact of risks such as floods, forest fires, extreme weather and infectious diseases will increase the next decennia.

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The MiSRaR project

For adequate prevention and reduction of the infringement of safety risks on the *vital interests* of European society it is important to share and develop knowledge and experience of the responsible public bodies as much as possible. The specific risk setting of (territories within) the EU member states may differ, but the underlying principles of mitigation are comparable. By learning from good practices and practical lessons from others, the public bodies within the EU should be able to improve their local approach on risk management. Simultaneously this helps to realize a certain degree of convergence and uniformity of structural risk management within the EU, which assists in the implementation of EU legislation, but also in the coordination of safety policies between Member States and adjacent regions.

Seven partners from six EU countries have joined forces to share knowledge and experiences on management of physical safety risks, specifically through spatial planning and design. The project Mitigating Risks in European Regions Relevant Spatial and Towns (MiSRaR) is cofinanced by the ERDF and made possible by the INTERREG IVC programme. Participants in the project are:

- Safety Region South-Holland South, The Netherlands (lead partner)
- Municipality of Tallinn, Estonia
- Epirus Region, Greece
- province of Forlì-Cesena, Italy
- municipality of Aveiro, Portugal
- municipality of Mirandela, Portugal
- Euro Perspectives Foundation (EPF), Bulgaria.

The goal of the project is to enable professionals in the field of risk management to learn from experiences in other parts of Europe. The project leaders and experts from the participating partners meet to do so at sixteen international seminars. During these seminars knowledge and experiences are exchanged. The experts from the partners are given the opportunity to bring forward their own expertise on specific types of risks. For example, forest fires, floods, landslides, extreme weather and risks of production, storage and transportation of hazardous substances have been discussed. In each seminar one step in the process of risk management is addressed. The partners share the results of the seminars within their local network of risk management partners. Where possible the lessons will be implemented.

To be able to share lessons learned widely within the EU, the results of the project are presented in three brochures and a complete handbook. Herein, based on experience of the participating partners and taking into account relevant EU regulations, the process steps of risk management and mitigation are described, with practical tips. Also, the good practices of the participating partners are made available. This way other governments within the EU can find inspiration and practical contacts on existing implemented policies which can improve systematic risk management.

Roadmap for this brochure

The core of this brochure is formed by an explanation of the three process steps of which risk assessment should ideally consist: risk identification, risk analysis and risk evaluation. Before these steps can be explained, first the core concepts of MiSRaR are discussed: 'risk' and 'mitigation'.

This brochure is aimed at the sharing of practical experiences: practical tips and tricks are presented. Also, a brief explanation is given of some of the good practices of the MiSRaR partners. A more detailed description of these practices can be found at www.misrar.eu. For those interested in more information, the contact information of the participating partners is included at the back of this brochure.

The concept of 'risk'

In practice the participating partners use different definitions of risk, derived from international literature. Comparison has shown that the various definitions ultimately amount to the same thing. The definitions only put different elements of the risk concept on the foreground. The two main definitions are:

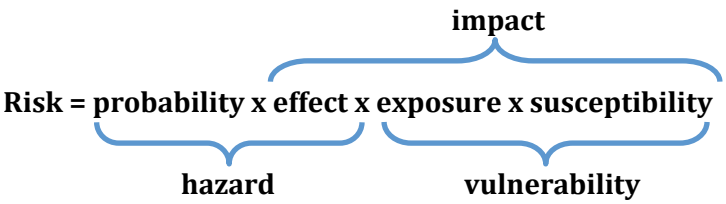
Risk = probability x impact

Risk = hazard x vulnerability

An important distinction is that between the English terms *risk* and *hazard*, which in several languages translate into the same word. Given the second definition the difference between a risk and a hazard lies in the vulnerability of the risk recipients: a potential hazard involves only the (likely) negative effect of an incident (disaster or crisis). The degree of vulnerability of people and the environment for such an effect determines whether this also amounts to a significant risk. To illustrate: a flooding itself can be seen as a *hazard*. However, if this occurs in an uninhabited area, without economic or ecological value, there is no or little *risk*.

Vulnerability is a composite concept, which consists of *exposure* and *susceptibility*. To illustrate: the extent to which buildings are vulnerable to a flood, depends both on the extent of the exposure (what is the height of the water?) and the degree to which it is actually truly affected by water (of what material and how solid is it built?).

The difference between the two definitions lies in the grouping of concepts. Combining these concepts creates the following aggregate definition:



Tips and tricks

Lessons learnt on the risk definition

The relative importance of the risk components may differ for decision makers

Important practical lesson of the MiSRaR partners is that the definition(s) of risk should not be construed as a quantitative, mathematical formula that leads to a aggregate risk score (a single number) based on which a risk ranking can be made. The formulas are meant to indicate that risk is a concept consisting of different components, but the scores should not just simply be multiplied. This could lead political and administrative decision makers to the unjustified conclusion that probability and impact by definition

have to be taken into account equally. It is important that in the assessment of risks both probability and impact are analyzed and weighed separately.

Every part of the concept of risk is relevant to identify risk reduction measures
An additional reason for separately analyzing the different components of the concept of risk is that each of them may lead to different kinds of protection measures. A risk may be reduced by addressing the elements of occurrence, the primary effect, the exposure and the susceptibility. For each type of disaster or crisis, it is relevant to consider what the most defining elements of the risk are, and thus where the greatest reduction opportunities lie.

Mitigation

Mitigation is an English word that is not easily translated for each language and is not used in a uniform manner (see the author's note). Within the MiSRaR project mitigation is defined as "risk reduction by reducing the probability and/or impact of a hazard and/or the vulnerability of the society." In other words, mitigation includes all forms of risk reduction for the various elements of the concept of risk. In the experience of the partners the distinction between risk and crisis management is not absolute. Preparation measures for specific risks (anticipation), such as spatial planning to ensure access for emergency services or evacuation possibilities, can be interpreted as preventive effect or vulnerability reduction. The focus of the project MiSRaR lies primarily on measures in spatial development and planning, but from practical experience also many other opportunities for risk reduction have been identified. Important lesson is that the early inclusion of risks in the spatial development and planning often yields the most fundamental opportunities for mitigation, but on the other hand, a successful mitigation strategy often consists of mixture of (not only spatial) measures.

The total of risk and crisis management measures sometimes is referred to as “multi-layer safety”, a term which has its origin in the process industry.[4] This concept is based on the principle that there are several layers of protection around a risk. The precise delineation of layers varies by country and sector. The second brochure will contain more information on this topic. In any case, the primary, inner layers concern risk management: the structural attention for physical (un)safety and the prevention, the reduction of unsafe situations and minimizing impacts of actual breaches of physical safety.[5] The outer layers relate to the actual disaster relief and recovery afterwards.

Structural consideration of safety risks and opportunities for mitigation in spatial planning processes requires a systematic approach. Risks must be identified early and the effects of safety measures must be weighed as soon as possible. New developments should be monitored continuously and opportunities to improve safety should be exploited when they arise. This mitigation process begins with understanding risks. The present brochure is devoted to this first step: risk assessment. In subsequent brochures the systematic approach to mitigation planning is discussed.

The process of risk assessment

During the exchange of knowledge the conclusion was reached that the steps of each of the MiSRaR partners to perform a risk assessment, are based on the same basic principles. Logically, in every language the terminology and definitions differ, but the partners have agreed upon three phases of risk assessment, consistent with international literature[6]:

- *Risk identification*
- *Risk analysis*
- *Risk evaluation*

Risk identification

Following the definition of risk the term *risk identification* is preferred above the more common *hazard identification*. Identifying risks requires both the identification of risk causes (risk sources) and risk receivers (vulnerabilities). The combination of both provides insight into the spatial distribution of risk, or in other words the presence of high-risk locations or situations. Risk identification is therefore defined as "the process of finding, identifying and describing existing and future risk situations."

Obviously the first question is: which risks are and which are not included? This may differ from country to country and also depends on the actual goal of the risk assessment. In many member states national regulation defines for which kinds of risks the local governments bear responsibility. Sometimes this is specified in detailed guidelines on which types of risk objects and vulnerabilities should be registered by the local authorities, for example by means of environmental permits. In other cases, the national government dictates to local governments to perform an assessment of a limited set of risks, which may differ every year.

Comparison between the partners led to the following list of safety risks that are usually included in an assessment.

<u>Natural disasters</u>
- Floods
- Earthquakes
- Land slides
- Forest fires
- Volcanic eruptions
- Extreme weather (cold, heat, draught)

<u>Technological risks</u>
- Accidents with the production, usage, storage and transport of hazardous materials (flammable, explosive and toxic)
- Nuclear/radiological incidents
- Disruption of public utilities (gas, electricity, drinking water, sewage treatment)
- Disruption of telecommunications and information technology

<u>Transport risks</u>
- Airplane accidents
- Nautical accidents
- Train accidents
- Traffic accidents

<u>Public health</u>
- Outbreak of infectious diseases
- Risks of long term exposures

<u>Social risks</u>
- Civil disorder
- Crowd panic

Important is to consider intentional incidents, such as terrorism and sabotage. Such intentional malicious acts by individuals or networks can be understood as a specific man-made *trigger event*, which may be applicable to many of the aforementioned types of disasters and crises (often simultaneously, due to domino effects). This is a particular problem which should be weighed separately in the assessment of all types of risks. The probability of deliberate incidents requires a different kind of assessment than the probability of a natural phenomenon or technological failure.

Besides, the impact of a deliberate incident often is different, because it usually is aimed at causing the maximum possible damage.
Identifying risks is an ongoing process, not exclusively aimed at just existing high-risk situations in the present. Risks are changing constantly. Economic development may lead to new high-risk human activities. Spatial development may bring vulnerabilities closer to risk sources, but may also offer opportunities for risk reduction. Also the frequency and severity of natural disasters develop over time. Therefore in foreseeable future developments should be considered in the risk identification. This may concern spatial developments like new residential areas and industries, but also new technological developments and changes in society that might pose new challenges. For example, the impact of climate change on risks like floods and extreme weather, the impact of new social media technologies for the speed with which social unrest could spread or impact of hydrogen cars on risk zones around fuel stations.

In addition, it is also important to consider risk in the past. Incidents and near incidents can provide insight in the historic return frequency of certain types of disasters and crises, and in the realistic magnitude of the effects. Historical research can help to assess risks in the present and may also reveal gaps in the risk identification.

Tips and tricks

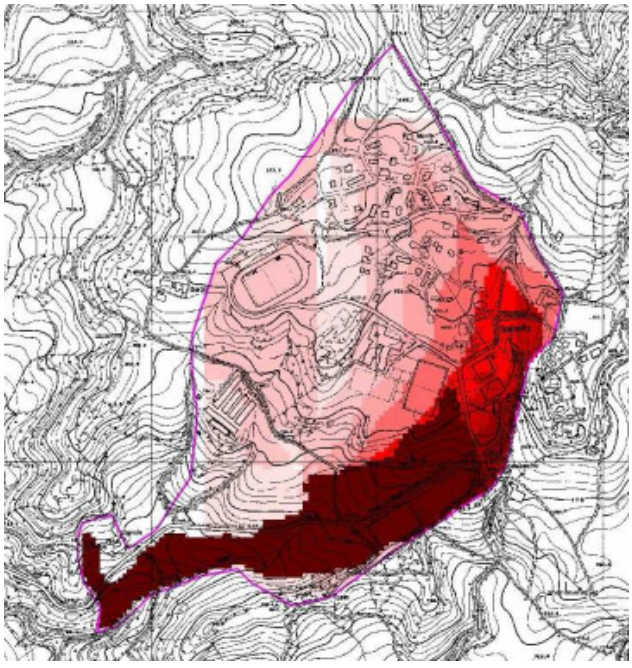
Lessons learnt on risk mapping

Essential part of risk identification is to display risks with a geographical component in a risk map. Based on the practical experiences of the partners various tips can be given.

Think carefully about the goals and target groups of a risk map.
When designing a risk map one should think carefully about the potential for multiple use. Supply creates demand: a risk map that is designed for a specific use, in practice can over time bring forward new needs. These needs may not always be met easily if not taken into account in advance. Widespread examples of usage of risk mapping are:

- As a planning tool for policy decisions on mitigation;
- As a tool for risk communication to citizens;
- As a tool in licensing high-risk activities;
- As a operational tool for a crisis committee to project the location and the (possible) effects of an incident;
- As an operational tool in emergency vehicles.

These different types of usage generate various demands on the quality and accessibility of a risk map. For example, for operational use a high level of supply guarantee (redundant systems) and very detailed mapping is needed. Multiple use



mostly will lead to a risk map of higher quality, but is not always desirable or even impossible to achieve. Therefore, think carefully at the outset what on the goals of a risk map.

Be realistic.
It is important before starting the development of a risk map to think critically about the ambitions. The requirements regarding multiple use should be considered, but also the scope risks that are included: which types of disasters and crises are (initially) taken into account and which are not? The chance of a successful project is greatest if the goals are realistic. Start with just a few risks and map layers and do not expand until these initial steps are successful implemented.

Reach agreement with information owners on the dynamic actualization of data.
For all types of use it is necessary to guarantee the actualization of the underlying information and the mapping. A risk map should always be up-to-date. Retrieving information directly from a primary source file is the best guarantee for current information. Agreements have to be made with the 'owners' of information sources on the actualization of their data files and the instantaneous projection of new information on the risk map. A risk map normally includes information from many different sources holders. Information management will therefore usually not be the task of a single body, but require cooperation in a network of partners, often both public and private. Effective collaboration requires a shared perception of the intended purpose of the risk

Good practice

Aveiro, Portugal

Risk mapping for flooding

The municipality of Aveiro is located at the Atlantic coastal line of Portugal. Aveiro has a flooding risk caused by the Vouga River in combination with the Atlantic Ocean. The Vouga River originates in the hill of Lapa, about 930 m altitude. Its basin has an area of 3645 km^2. After a journey of 148 km it flows into a lagoon, called 'Ria de Aveiro', which communicates with the Atlantic Ocean. This lagoon surrounds and creates an interface through a network of canals on the northwest side of the city of Aveiro. During high tides and ocean storms the sea level temporarily rises, decreasing the draining capacity of the river. Often this coincides with heavy rain falls, raising the level of the river itself. In various cases in the past this has resulted in an actual flooding of the urban city centre and the surrounding lower rural areas. To get a grip on this flooding risk the municipality of Aveiro started a project to gain more precise insight in the impact of a flood. The University of Aveiro was asked to do research in order to develop an online risk map with the projected flooding area. On several layers the potential depths of floodings and the vulnerabilities, like housing and infrastructure, are projected. By this means the most important risk locations can be identified. This enables the administration to take the flooding risk into account in future spatial planning, ideally resulting in concrete mitigation measures to protect new and existing areas against the flood risk and increase evacuation possibilities.

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map and the required quality. It helps if all parties recognize the value of the risk map for their own organization.

A risk map on its own is no guarantee for public risk awareness
Public access to a risk map is only a first step towards actual risk awareness of citizens and enterprises. Only with an effective communication strategy it is possible to achieve good usage and understanding of a risk map. Even then it is not certain that people actually will undertake measures to be prepared for disasters. An important lesson is that in general a risk map is most effective if it offers concrete suggestions on how people can act in case of occurrence of different types of incidents. Without such information, the knowledge of risks in your environment might above all be a "burden" for citizens: why would you consider risks in your neighbourhood if there is nothing you can do about it yourself? To find out what the actual information needs of the residents are, it is advisable to think carefully about public participation in the process of developing a risk map.

Ensure proper security of sensitive information.
Certain risk information could be misused for planning terrorist attacks or sabotage. Some countries have therefore decided not to make risk maps publicly accessible. Whether or not to disclose a risk map should always be considered during the designing process. The importance of transparent communication about risk taking must be weighed against the chances of any abuse. Another consideration is that normally most information on a risk map already is freely available by other means. A risk map in this sense often does not pose an additional security threat. For information that truly is sensitive or even strictly confidential, a security strategy is needed. It might be necessary to incorporate different authorization levels in the risk mapping system. Even with a risk map which is only used by professionals, this might prove a necessity, because mostly hundreds or even thousands of professionals might need to have access.

Risks do not respect man-made borders.
A risk map always has borders. Risk however do not respect man-made administrative borders and often even not natural boundaries. A disaster in one area can often directly affect other areas. Recent volcanic eruptions have shown that in some cases such effects can be felt even thousands of miles away. A public authority, whether local, regional, provincial or national, will therefore always have to think about the disclosure of information about potential border crossing risks. Specifically for risks that might cross borders between EU member states the Helsinki Treaty stipulates that national governments should inform each other of hazards within 15 km of the national borders.

Risk analysis

The second step in risk assessment is the risk analysis. This step can be defined as "the process to determine the nature and relative magnitude of risks." The goal is to prioritize which risks need most policy attention. What underlying concept of risk is used, determines the approach to this

step. The United Nations, for example, argues that risk assessment is aimed at determining hazard and vulnerability.[7] The European Union refers to this definition, but focuses on assessing the probability and impact.[8] As previously outlined, both definitions of risk actually share the same underlying factors. The choice of a definition does, however, have consequences for the presentation of a risk analysis. In one case, risks are ranked in classes
of hazard and vulnerability, in the case of other classes of probability and impact. Within the MiSRaR project examples of both approaches have been found. One approach is not necessarily better than another, but when choosing a method, it is important to take the differences into consideration. In general, the approach of hazard and vulnerability is especially useful for separate analysis (*single hazard approach*) of natural disasters, because man cannot influence these *hazards*, such as earthquakes, volcanic eruptions and extreme weather. For those risks it is particularly useful to focus on a proper analysis of the vulnerabilities (people, economy, ecology), because those hold the only options for risk reduction. On the other hand, the approach to probability and impact is particularly useful for simultaneous analysis of different types of risks, because it is possible to present the outcome by means of a risk diagram, which enables decision-makers to compare the relative severity of various risks transparently. This is also referred to as an *all hazard approach*.

Single hazard approach
In a single hazard approach one focuses on analysing the risk of a specific type of disaster or crisis, usually in a specific geographic area and for a specific time period. In practice, many available examples of such analysis have been found, for example for forest fires, floods and landslides. This type of risk analysis is aimed at determining which of the identified risk locations face the greatest risk, in order that specific risk and/or crisis management policies can be implemented. The methods for single risk hazard risks vary

Good practice

Mirandela, Portugal

Single hazard risk analysis of forest fires

For the Portuguese municipality of Mirandela the risk of forest fires is very tangible. The municipality is located in the Northeast of Portugal, in the District of Bragança. Forest fires are one of the biggest risks in the Municipality. Historical research proved to be an important success factor for the municipality to get a grip on this risk. Annual registration of forest fires by the Municipality generated excellent insight in the occurrence of fires. Despite the high risk awareness of the population the principle causes of forest fires turned out to be human: use of fire in agriculture and barbecues during the weekend. With this insight the municipality was able to give specific risk education.
Registration and historical research also made it possible to project the spatial distribution of the yearly probability of forest fires on a risk map. On this risk map the territory also is divided into five classes of expected fire intensity, based on the land use, type of vegetation and the mountain slope. Another layer of the risk map contains the vulnerabilities within the territory, like housing and industries. By projecting the spatial distribution of probability, expected effects and vulnerabilities, Mirandela was able to perform a targeted risk assessment. This resulted in the identification of three high risk areas. In these areas specific policies were implemented to prevent and control forest fires, such as manual or mechanical cutting of the combustible material that exists in the forest, chemical treatments to reduce inflammability, grazing by life stock and prescribed burning (preventive fire). *Visit www.misrar.eu for the full description of this good practice.*

widely. For example, for forest fires other risk factors are decisive than for floods. The results of such risk analysis therefore are mostly difficult to compare. On the other hand, such a risk-specific approach may offer clues to more specific targeted policies than a generic risk-transcending approach.

All hazard approach

In an all hazard approach in principle, all conceivable safety risks (from the list presented above) could be considered simultaneously. This means that risks like explosions must be made comparable to social unrest, or major infectious diseases to disruption of public utilities. To be able to compare completely different risks in an *all hazard approach* some sort of 'yardstick' is needed, with which the consequences of a risk for the various types of "vital interests" of society may be measured in a comparable way. The concept of *vital interests* has long been used by several countries and is now also part of the proposed joint approach to national risk assessment within the EU.[9]

The Safety Region South Holland South has obtained practical experience with such an all hazard method of risk analysis. This method is described in the National Risk Assessment[10], used by the national government, and in the guideline for Regional Risk Assessment[11], which is used by the 25 Dutch Safety Regions (see good practice). This method is based on six regional vital interests:

1. Territorial security
2. Physical safety
3. Economical safety
4. Ecological safety
5. Social and political stability
6. Safety of cultural heritage

Good practice

South-Holland South, The Netherlands

All hazard risk analysis as a part of the regional risk profile

In The Netherlands the 25 Safety Regions perform a risk assessment based upon a national method. The so-called regional risk profiles give insight in the actual and future risk situations, the probability and impact of the representative risk scenarios and the possible risk reduction and preparedness policies. Overall aim is to enable the municipalities to make informed decisions on the most effective policy measures.

In The Netherlands municipalities and provinces are by law required to perform a risk identification, projected on a provincial risk map. The identified risks are analyzed by means of a scenario analysis. For every type of risk the representative scenarios are described. The impact of these scenarios on six vital interests of society is measured, by means of ten criteria. Each of these criteria results in a score. The weighed sum of the ten criteria results in a overall impact score from A (lowest impact) to E (highest impact). Also the probability is scored in five categories. Result is a risk diagram in which the probability and impact of all different kinds of risks is presented.

The risk diagram enables the political decision makers to make an integral consideration between risks that occur in social sector which are in principle completely different. Within the method explicit attention is paid to the risk evaluation: by means of which criteria do the decision makers evaluate the outcome of the risk analysis? Another key element is the so-called capability assessment. By means of the scenarios an assessment is made of the potential for targeted risk reduction and disaster preparedness.

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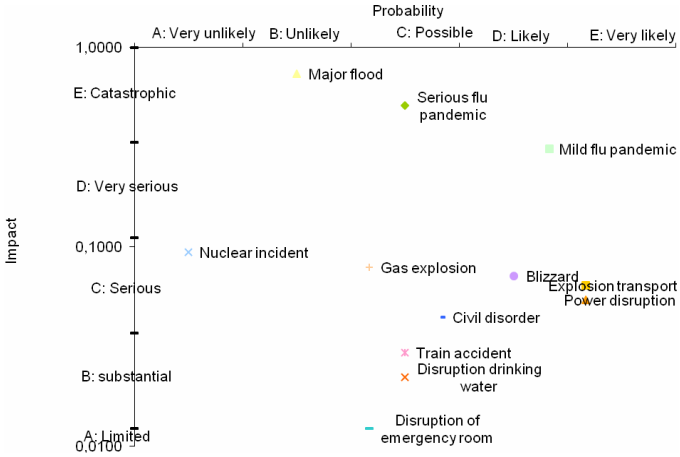
A commonly used approach for all-hazard analysis is called scenario analysis. Insight in actual and future hazardous situations does not automatically translate into a risk analysis. It is impossible to try to separately analyze the hundreds or even thousands indentified hazardous situations. Instead, in a scenario analysis a representative scenario is made for every relevant risk category. The main reason for the use of scenarios as an instrument for risk assessment is the possibility to define the critical elements in the development of a disaster or crisis, as a basing for strategic policies. A scenario analysis enables the identification of the most important factors with which the outcome of a disaster or crisis can be influenced positively, by means of both risk reduction (probability, effect and vulnerability) and disaster preparedness.

Tips and tricks

Lessons learnt on risk analysis

Different types of risks may require different types of analysis.
It is important to consider in advance what approach is best suited to the goal of a risk assessment. Sometimes a risk is transparently manifest and priority, so there is no necessity to make a comparison between different risks. In that case a single hazard approach to define the most important risk locations and policy options is the best way. The exact method for such a single hazard approach will strongly depend on the defining characteristics of the risk at hand. In other cases it may be more convenient to make an all hazard risk analysis, to be able to prioritize which risks need most attention.

Focus on the need for actual risk policies.
Conducting a risk analysis is not an end in itself. It is a means to achieve prioritization of risks, in



order to direct the available resources, manpower and political attention to the 'right' risks. Moreover the risk analysis is a means to identify policy options. An effective risk analysis provides insight into the risks and simultaneously helps identifying opportunities for improvement in both risk management and crisis management. For this the method of scenario analysis can be helpful. In a scenario analysis, the causal web of causes and effects is outlined. This allows the identification of targeted strategic policy measures for all aspects of multi-layer safety and for all types of impacts.

Develop a network of partners.
To be able to perform a risk analysis a lot of information, knowledge and expertise is required. No government agency will have all what is needed directly at disposal within its organization. Therefore risk analysis will always require close collaboration among several public and private organizations. Public bodies need to develop networking capabilities and a good relation with all partners. Such a good network is not only useful for the analysis, but also for the actual implementation of policies and resource allocation.

Organize structural implementation of risk analysis processes.
Just like risk mapping, risk analysis has to be a continuous process, because risks evolve over

time. Moreover, the implementation of earlier risk management policies ideally results in an adjusted risk analysis that shows the effectiveness of the risk measures. This may lead to new political risk priorities. Therefore it is important to establish and maintain information and knowledge on risk analysis processes within the organization of the responsible authorities.

Risk evaluation

The third and final phase of risk assessment is called risk evaluation. In this phase, the conclusions of the risk identification and risk analysis are submitted to the (political) decision makers. Risk and crisis management is not intended to achieve absolute security, but is part of a political-social assessment process, taking into account the public interest of risky activities. For example, modern society can simply not do without hazardous substances. Also, it is irrational to expect areas which are prone to flooding, landslides or volcanic eruptions to be evacuated permanently. Ultimately the aim must to achieve a level of safety which is acceptable for both politicians and citizens. This means that the political and administrative decision makers always shall have to evaluate the outcome of a risk analysis on basis of their own values and preferences.

To evaluate which of the analyzed risks should be chosen as a priority, many different evaluation criteria can be taken into account. Examples are:

- public risk awareness and concerns of inhabitants;
- the relative importance of the vital interests: for example, for one decision maker risks with potentially a lot of victims might be most important, while another might want to give priority to risks with severe economic or ecological consequences;
- existing policy priorities and political programs.: for example, existing risk reduction policy programs;
- instructions from higher government levels: for example, national priorities and budget allocation;
- prestigious projects, like new housing or industries;
- quick wins: cheap measures with considerable advantages;
- the economical importance of certain risky activities;
- an imbalance between the risk level and the actual disaster preparedness.

Safety professionals have to perform objective risk analysis, but must be well aware that the decision makers will interpret the outcomes on basis of their own subjective political preferences. Therefore, an option is to ask the decision makers to explicit their subjective evaluation criteria during the decision process.

Preview: from risk assessment to mitigation planning

The following MiSRaR brochure deals with the mitigation process: how may the insights from the risk assessment be translated into concrete policy options? How does mitigation planning work? What are the options to acquire structural attention for safety in spatial planning? How can local authorities align their risk management policies with those of other public and private bodies? These and other questions will be answered in the next brochure.

Interested in more information?

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This is the first of three brochures. The main language of the MiSRaR project is English. Besides English, the brochures and the handbook have been translated into the languages of the participating partners: Bulgarian, Dutch, Estonian, Greek, Italian and Portuguese. The most important concepts are always indicated in English as well as in the partner language. Due to differences between the languages it is possible that certain words in the translations might be interpreted (partially) different than in English. To prevent this as much as possible, for several concepts a definition is provided.

Colophon

This is a joint publication of the Safety Region South-Holland South, the Municipality of Tallinn, Europerspectives Foundation, the Province of Forlì-Cesena, the Epirus Region, the Municipality of Mirandela and the Municipality of Aveiro.

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Notes

[1] http://ec.europa.eu/environment/seveso/
[2] http://ec.europa.eu/environment/water/flood_risk/
[3] Philipp Schmidt-Thomé, *Integration of natural hazard, risk and climate change into spatial planning practices*, 2006.
[4] *Layer of Protection Analysis: Simplified Process Risk Assessment*, Centre for Chemical Process Safety (CCPS), USA, 2001.
[5] *Guideline for policy plans of the Dutch Safety Regions*. Safety Region South-Holland South, commissioned by the Dutch Association for Fire fighting and Disaster management, the Dutch Association for Medical Emergency Management, the Council of Chief Constables and the Council of Municipal Disaster Management, 2008.
[6] ISO 31010.
[7] United Nations International Strategy for Disaster Risk Reduction (2009)*UNISDR Terminology on Disaster Risk Reduction.* (Geneva, UN ISDR).
[8] *Staff Working Paper on Risk Assessment and Mapping Guidelines for Disaster Management* http://ec.europa.eu/echo/civil_protection/civil/prevention_risk_assessment.htm, December 2010.
[9] *Staff Working Paper on Risk Assessment and Mapping Guidelines for Disaster Management* http://ec.europa.eu/echo/civil_protection/civil/prevention_risk_assessment.htm, December 2010.
[10] *Method for National Risk Assessment*, Ministry of Safety and Justice, The Netherlands, 2008.
[11] *Guideline on Regional Risk Assessment in The Netherlands*. Houdijk Consultancy c.s., commissioned by the Dutch Association for Fire fighting and Disaster management, the Dutch Association for Medical Emergency Management, the Council of Chief Constables and the Council of Municipal Disaster Management, 2009.

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