



Handbook

Mitigating Spatial Relevant Risks in European Regions and Towns





Safety Region South-Holland South

The Netherlands

www.vrzhz.nl



Municipality of Tallinn

Estonia

www.tallinn.ee/eng



Euro Perspectives Foundation

Bulgaria

<http://www.europerspectives.org>



Province of Forlì-Cesena

Italy

www.provincia.fc.it



Region of Epirus

Greece

www.php.gov.gr



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www.cm-mirandela.pt



Municipality of Aveiro

Portugal

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Colophon

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MiSRaR project, www.misrar.eu

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Preface

“Starting with an European project with seven different partners was an overwhelming prospect, but in the end it proved to be the experience of a lifetime for all people involved.”



Nico van Os, general project manager MiSRaR //
Safety Region South-Holland South, The Netherlands

In 2009 seven local, regional and provincial governments throughout the European Union joined their forces to achieve an ambitious goal: improving and structuring processes of risk mitigation in spatial planning, not only in their own area but throughout the entire European Union. Their approach was the sharing of knowledge, practical experiences and good practices with each other and making the resulting lessons available throughout the EU. To make this possible the seven partners applied for a co-financing contribution by the European Regional Development Fund (ERDF) through the INTERREG IVC programme. Some of the partners had previous experiences with European projects, while others did not. For them the prospect of starting the project was not only challenging, but also a bit overwhelming. However, when the project started the international cooperation proved to be so valuable and fruitful, that all involved quickly became a very close and solid team.

Now, in the summer of 2012, the so-called MiSRaR project is drawing to a close. In this handbook you will find the results of sixteen MiSRaR seminars and the exchange of over a hundred practical experiences. We hope this will prove to be helpful for other governments within the EU, as well as for international cooperation and knowledge exchange.

The MiSRaR team would like to thank the ERDF and INTERREG IVC programme for making the MiSRaR project possible. By doing so they have proved the value of European cooperation.

The MiSRaR team

1 Introduction

“Structural knowledge exchange is of the utmost importance. Advancement of the European peoples through transboundary learning is one of the essences of the European Union”

Antoin Scholten, Mayor of Zwijndrecht //
Safety Region South-Holland South, The Netherlands



1.1 The importance of proper attention for risks

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 recent SEVESO-III directive (2012/18/EU)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. The explanation for this is not only the higher number of occurrences, but also the greater economical value of the affected territories.³ The population density in urban areas is rising, which creates the need for further spatial development. The consequence is an increasing number of people, buildings and vital infrastructures within the direct vicinity of man-made risks and often also within areas potentially affected by natural disasters. Moreover, due to the expected climate change the probability and economical impact of risks such as floods, forest fires, extreme weather and infectious diseases is likely to increase over the next decennia.



1.2 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 experiences 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 to 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 with 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 of mitigation strategies. The project Mitigating Spatial Relevant Risks in European Regions and Towns (MiSRaR) is co-financed by the ERDF and made possible by the INTERREG IVC programme. Participants in the project are:

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

MiSRaR addresses the issue of mitigating risks through multi-layer safety in general and the inclusion of risk assessment and risk management in spatial planning in particular. The goal of the project was to enable professionals in the field of risk management to learn from experiences in other parts of Europe. During the three years project time a starting conference, sixteen thematic seminars and a closing conference have been organized. The thematic seminars each dealt with one of the steps of the mitigation process. During these seminars knowledge and experiences were exchanged. The experts from the partners were given the opportunity to bring forward their own expertise on the mitigation process and 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.

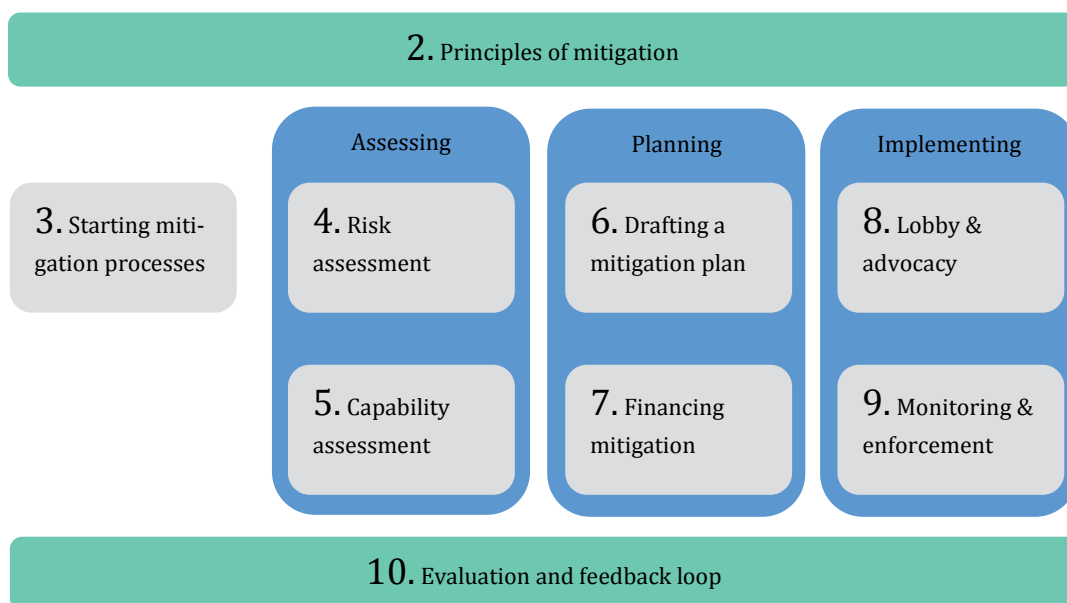
The partners have shared the results of the seminars within their local network of risk management partners. After every seminar the partners organized local meetings with their risk management partners to disseminate the results and prepare the next seminar. MiSRaR therefore not only strengthens the creation of an European mitigation network, but also strengthens networking and cooperation at the participant's local and regional level.



To be able to share lessons learned widely within the EU, the results of the project are presented in three brochures and this handbook. Herein, based upon the experiences 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 on the website www.misrar.eu. This way other governments within the EU can find inspiration and practical contacts on existing implemented policies which can improve systematic risk management.

1.3 Roadmap for this handbook

During the MiSRaR seminars the participants have identified several general lessons which should be taken into account when designing a mitigation strategy. In chapter 2 an overview is presented of these basic principles of mitigation planning. Chapter 3 gives an overview of the different kinds of mitigation processes and how they start. Chapter 4 deals with the first step of the actual process: risk assessment. In the following chapter 5 the general approach to finding mitigation instruments is described: the capability assessment. Together chapters 4 and 5 constitute the ‘assessing’ part of the process. The ‘planning’ part consists of the actual mitigation plan and the financing for it, discussed in chapter 6 en 7. Hereafter lobby & advocacy and monitoring & enforcement are discussed in chapter 8 and 9 as part of the ‘implementing’ stage. In conclusion the circle is completed with the evaluation and feedback in chapter 10 and recommendations for local and national governments within the EU in chapter 11. The handbook is completed by an epilogue and several annexes.





This handbook is aimed at the sharing of practical experiences of local and regional European governments, rather than comparing international (scientific) literature. Therefore, in the text many practical tips and tricks are presented and the theoretical contemplations are kept to a minimum. 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.

1.4 Note on the languages

The common language of the MiSRaR project has been English. This handbook has been written in English and subsequently translated into the languages of the participating partners: Bulgarian, Dutch, Estonian, Greek, Italian and Portuguese. The most important concepts are 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.





2 Principles of mitigation

“Knowledge exchange starts with common understanding of basic principles. European cooperation on mitigation will greatly benefit if shared definitions are set.”



Nikos Batzias, computer engineer // Epirus, Greece

2.1 The concept of ‘risk’

The understanding of mitigation starts with the understanding of risk. In practice the participating partners of MiSRaR 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:

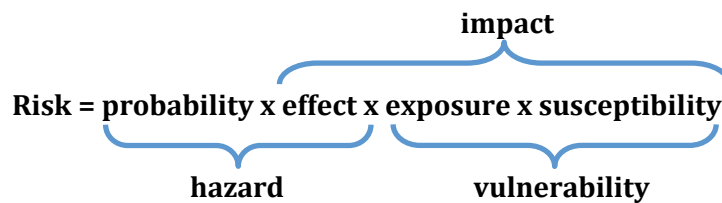
$$\text{Risk} = \text{probability} \times \text{impact}$$

$$\text{Risk} = \text{hazard} \times \text{vulnerability}$$

An important distinction is that between the English terms *risk* and *hazard*, which in several languages both 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 an 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.

2.2 The concept of 'mitigation'

Mitigation is an English word that is not easily translated for each language and is not used in a uniform manner. 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 also be interpreted as preventive effect reduction or vulnerability reduction. The focus of the project MiSRaR lies primarily on measures in spatial development and planning, but from



practical experiences also many other opportunities for risk reduction have been identified.



Tips and tricks

Lesson learnt on mitigation processes in general

Early involvement of safety in spatial development should be paramount.

An important lesson is that the early inclusion of risks in the spatial development and planning often yields the most fundamental opportunities for mitigation. For example, in the earliest stages of planning for new industries, housing projects or spatial restructuring a lot of options are still open. The most fundamental option is to really consider the safety aspects of projected locations of risk sources and vulnerabilities, in order to create adequate safety distances. In the early phases of spatial design this kind of fundamental mitigation options is still possible. Also spatial measures in other levels of multi-layer safety, like evacuation routes, structural protection measures for vital infrastructures and stricter safety norms for buildings, can often be realized with far less costs than in later stages when the designs are already made.

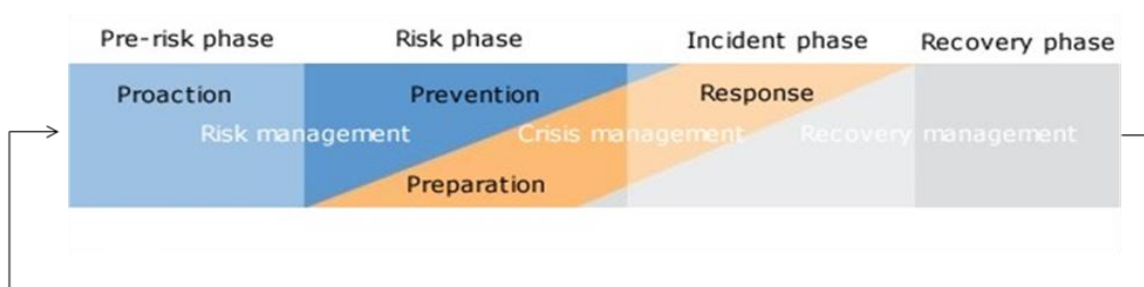
2.3 Multi-layer safety

In the practical experience of the partners three kinds of safety management can be distinguished: *risk management* directed at reducing risks, *crisis management* directed at 'fighting' the consequences of an actual incident ('a materialized risk') and *recovery management* directed at returning society to its normal state from before the incident. On the other hand a distinction can be made between four different phases: the pre-risk phase before there is a risk, the risk phase during which a risk is present but not yet materialized, the incident phase and finally the recovery phase.

The three kinds of safety management are not strictly corresponding to these phases, but are gradually 'phasing in and phasing out'. In the pre-risk phase all is directed at the ultimate form of risk management: preventing a situation from becoming a risk, sometimes also referred to as 'pro action'. This is the most fundamental form of mitigation: As soon as a risk is 'in place' the attention shifts to prevention measures for reducing the probability, the potential effects from an incident and the vulnerability (exposure and susceptibility) of the 'elements' at risk for those effects. At the same time, in this risk phase, the responsible public and private partners, like the emergency services, will prepare for incidents. This preparation of course consists of disaster planning, education and exercises, but as pointed out before may also include spatial measures. Examples are access routes for emergency services, water supplies for fire brigades and clear grounds for disaster relief operations. Moreover, in the risk phase a start can be made with recovery management, by preparing measures which make recovery easier. Other examples can be the recovery plans and contracts with

private partners for restoring public utilities. Also structural and even spatial recovery measures could be taken. For example, an extra (redundant) motorway may be constructed for when another is blocked by a landslide or flood, or reserve production capacity may be prepared on a separated location of an industrial factory. Another example is planting trees which recover quickly after a forest fire. However, in practice the experience is that these kinds of measures mostly have no priority for the decision-makers, because all attention goes to mitigating the risk and preparing for disaster relief.

During the incident phase the preparation turns into actual ‘response’ or disaster relief. During this phase a start is made with recovery. Many actions by the emergency services may be characterized as recovery rather than actual response. As time goes by the priority more and more shifts from response activities to recovery, until in the end the actual incident phase is closed and is followed by the stage of recovery. During the recovery a new situation arises. The recovery may be an opportunity to reassess the risks. In most cases the occurrence of a crisis or disaster generates public and political attention for risks. This new risk awareness may strongly decrease the risk acceptance, leading to all kinds of mitigation strategies. Therefore the cycle is closed: from the recovery phase a new pre-risk phase arises.



The total of risk, crisis and recovery 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. 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. Therefore, in the following two chapters attention will be paid to the starting of a mitigation process and the first step of risk assessment.



Tips and tricks

Lesson learnt on multi-layer safety

A successful mitigation strategy often consists of a mixture of measures

In contrast with the previous lesson, it is important to consider options in all levels of multi-layer safety. Although the most fundamental mitigation is preventing the potential effects of an incident from reaching the vulnerabilities (people, economy, ecology etc.), also measures to increase resilience, response and recovery should be taken into account. This is a matter of 'not putting all your eggs in one basket'. In many cases an effective prevention policy to decrease the probability of an incident, also means the effects and vulnerability will be larger in case an incident does happen.



3

Starting mitigation processes

“The practical approach to mitigation might differ between countries, but the underlying processes are comparable. For each local government the essential issue is to reconcile mitigation and spatial development.”

Mariya Basheva, project manager //
Euro Perspectives Foundation, Bulgaria



3.1 The starting point of a mitigation process

In many cases a mitigation process has no clearly identifiable starting point. In the current practice it is not very common to just “sit down and say: let’s start mitigating”. A lot of the processes with consequences for risks and opportunities for mitigation are triggered by other interests than physical safety. For example, spatial development and restructuring, new infrastructure projects and new industries all have potential safety consequences, but are not primarily driven by safety interests, let alone by the need for risk reduction. These kinds of developments often have a long run-up of political debates on necessary developments. Also the ideas for these kinds of developments originate frequently from the private sector, in which case the outlines may already have been set even before the government is informed. This is a pity, because the most fundamental opportunities for risk reduction often arise in the earliest stages of developing concepts for development. This stresses the importance of getting involved at the forefront of initiatives. When trying to integrate mitigation in economical and spatial development the most important task is to have an early warning for new initiatives. Ideally in the first stage of developing ideas and concepts for a new spatial plan the safety experts are automatically invited to participate. However, in current practice this is often not the case.

Ideally every mitigation process should start with a transparent problem definition and description of goals and objectives. What is it the responsible governments want to achieve? What mandate do they give to the involved bodies? What is the scope and budget of the project organization? For a successful mitigation process these kinds of questions should be answered before starting. The answers to these questions depend heavily on the legal framework. At the outset of a mitigation process it is there-



fore important to consciously consider what the relevant legislation is and how it should be applied.



Tips and tricks

Lessons learnt on starting mitigation processes

Before starting a mitigation process it is important to reflect on the following questions:

Just mitigation or multi layer safety?

As described in the previous chapter, mitigation is just one aspect of addressing risks. In a multi layer safety approach also aspects of disaster preparedness and recovery can be taken into account. Also risk measures in spatial planning may be broader than just mitigation: in spatial planning also measures to improve disaster response could be taken, like escape routes, water supply for the fire services, roads and spaces for the emergency services to operate on et cetera.

Single hazard or multi hazard?

Mostly mitigation plans are made for a single risk (like floodings) or even a single risk location (like a specific industrial site). However, mitigation plans sometimes address more than just one risk, or even the whole range of risk in an all hazard approach. Think carefully what it is you want.

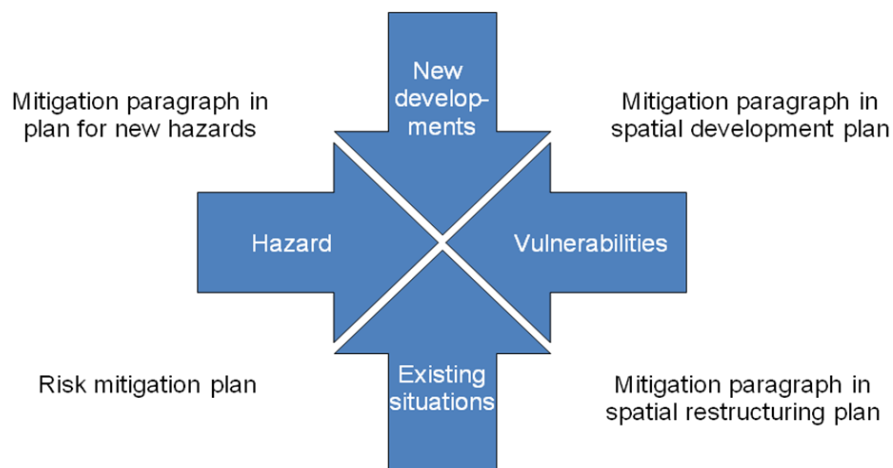
Joint planning or separated planning?

Often mitigation plans are made in a partnership by the actors involved. However, in some cases partners prefer to just make their own mitigation plan or even refuse to cooperate with the main authorities. Sometimes a phased approach can be useful, for example making a general mitigation plan with joint objectives, but implement this by means of several (partial) mitigation plans of the partners involved. This could help to implement the mitigation, because each partner takes the necessary measures into account in their own (regular) plans.

3.2 Differences in mitigation processes

The MiSRaR partners have found that in practice the majority of mitigation processes is not “by the book”. The instances in which a conscious decision is taken by the responsible authorities to start an integral mitigation process and follow a complete and rational planning process are limited. When this is the case, it is mostly on the basis of a directive of the national government, which indicates that regional and local governments are required to develop a mitigation plan for a specific risk. In those cases mostly the national government also sets the general principles and sometimes even directs the financial resources to the specific risk.

However, in the broader perspective of different approaches to mitigation planning the instances in which a conscious decision is taken to start an integral mitigation process are limited. In most cases mitigating a risk is not the primary goal. Safety often is merely one of the vital interests which should be taken into account, alongside interests like the economy and ecology. Result of the discussions by the MiSRaR partners is a typology which differentiates between four kinds of mitigation planning processes, derived from two distinctions in the underlying cause or motivation of the process. The first distinction is that between existing risk situations and new ones. The second distinction is that between processes which primary try to address the risk sources (hazards) themselves versus those aimed at the elements at risk (vulnerabilities). In the figure these two dimensions are confronted to each other, leading to a typology of four kinds of mitigation plans.



Mitigating new hazards

The first one is the introduction of a new (or increased) hazard. In cases of man-made risks this mostly concerns the founding of new industries and new infrastructure (with transport of dangerous substances). Those kinds of risks are governed by many forms of legislation, like the SEVESO-III directive (2012/18/EU)¹, which require risk and environmental assessments and risk prevention policies. In those cases the mitigation process is aimed at a transparent evaluation of the projected economical benefits of the proposed activities, confronted by the (potential) costs in terms of risk mitigation and actual damage by incidents. In concrete, mitigation might be a chapter or paragraph in the overall development plan, but depending on the legal obligations also a formal mitigation (and disaster preparedness) plan may be required. In case of a new or increased *natural* hazard there are less formal or legal incentives for a mitigation plan or paragraph. A solid approach to risk identification is needed to have an early warning for new or increased natural risks and to be able to contemplate on the necessity of a specific mitigation plan. Examples are mitigation plans for global warming.



Mitigation in spatial developments

The second type of mitigation processes is when there are new developments, not of new risk sources, but of new vulnerabilities. This includes the development of new housing projects, new 'vulnerable objects' (like hospitals, schools) and new vital infrastructure for public services (like power or water stations), which might be in the vicinity of man-made or natural risk sources. These developments are not primarily motivated by reduction of risks, but mostly by economical gains. Also in these cases there is legislation which governs the development process. However, in the practical experience of MiSRaR the legislations on spatial development in the EU member states is not always sufficiently taking into account aspects of mitigating physical safety risks. Fire safety of individual buildings is strongly regulated, but an all hazard, territorial view on safety risks seems to be lacking. From the point of view of risk mitigation the most important task in these kinds of developments, is to ensure attention for risks in the earliest stages of designing and to include a mitigation paragraph in the spatial development plans.

Mitigating existing hazards

The third type of mitigation processes is the one that is the most 'by the book'. This kind is started from the perspective of existing hazards. On the basis of a full risk assessment insight may be gained in the most important hazard locations to mitigate. For those ones a mitigation plan might be drafted, including all kinds of measures from the perspective of 'multi layer safety'. This kind of fundamental mitigation processes is very limited. By the MiSRaR partners only single hazard examples have been found. An all hazard territorial approach to mitigation, starting with an all hazard risk assessment, seems to be rare. Moreover, the examples of the complete (single hazard) mitigation plans which do exist show that most attention is given to non-structural measures and disaster relief. The reason for this is quite logical: structural and spatial mitigation measures are very expensive and mostly arise when there are other (economical) interests in spatial development.

Mitigation in spatial restructuring

The fourth category of mitigation is from the perspective of existing vulnerabilities. This is the case when a local government decides to restructure an existing area. Like new spatial developments this kind of cases is mostly not primarily motivated by risk mitigation. However, because existing risk situations often have been already identified and discussed upon in the past, the political decision-makers might be more willingly to take safety measures into account. In those instances the goal might be to incorporate the safety interests in the overall restructuring plan.



Tips and tricks

Lesson learnt on differences in mitigation processes

Integrate safety interests in other processes.

The general and one of the most important lesson for the MiSRaR partners is: try to incorporate safety interests and mitigation in all different types of plans and on all possible levels of developments. Most opportunities for mitigation arise in developments which are motivated from economical interests. The actual instances of complete mitigation plans from safety perspective are very limited.

3.3 Network assessment

In the starting phase of a mitigation process sufficient attention has to be paid to building of good network. Effective mitigation always requires the involvement of various entities and therefore of various formal and informal decision-makers. Cooperation among the bodies involved is vital, because it is important to know exactly what each partner has to do and how this will be done. Because the most opportunities for mitigation arise in initiatives from other (economical) perspectives, it is important to help other public and private organizations to understand the safety interests.

In practical experience of the MiSRaR partners the essence of a network or stakeholder assessment consists of three steps, similar to risk assessment and capability assessment (see chapters 4 and 5).

Network identification

The first step is to make an all-round inventory of all stakeholders relevant to the risk(s) at hand. This should include public bodies, private companies and interest groups of inhabitants and local commerce. The main fields in which stakeholders have to be identified are (inter)national legislation and local regulations, the financial resources allocation and the actual political goal setting.

Network analysis

The second step is to research the nature of the relationship with the different stakeholders. This might be formal relationships which are governed by legislation, like the relationship with public bodies that hold formal mandates for mitigation or spatial development, or the relationship with a body that holds relevant allocated budgets. A formal relationship might also be that of political decision power or mandatory involvement in decision processes and public participation. On the other hand a relationship might also be of more informal nature, like that with influential expertise centres or local interest groups. Important is to analyze not only the kind of relationship, but also the interests of the identified stakeholders and what their opinions are on the risk at hand. The intended result is an answer to the following questions:



- Who has influence on the mitigation process?
- Who holds formal mandates?
- Who has (potential) budgets?
- Who might be an opponent?
- Who might be an ally?

The last question might also lead to an preliminary idea on potential alliances which could be formed in the phase of lobby and advocacy (see chapter 8).

Network evaluation

The third step is to evaluate which stakeholders are deemed most 'important' to involve and in which part of the mitigation process. In many cases there are simply too much different stakeholders. Therefore it is not always possible to include all potential partners in the process, or at least not at all stages. To make a selection it might be useful to determine some criteria, or in smaller networks it might be done almost naturally and on past experiences. In any case mandatory involvement (by law) of course is the first selection criterion. Expertise which is needed for the mitigation process might be another. Moreover, it is important to evaluate which partners are most important for a successful implementation and which partners might obstruct a process if not properly involved.



Tips and tricks

Lessons learnt on networking

Consider your network as early as possible

Networking should start from the earliest outset of a mitigation process. The best way to gain support for mitigation is to build joint understanding of the problems at hand. The required risk awareness of all relevant partners can be realized by involving them in the earliest stages of the risk assessment.

Start with clear agreements on the process

When starting a mitigation process it is important to be clear about the roles of all partners involved and what they can expect. At which moments during the process will they be consulted, how are decisions formally made, what expertise is needed from their organizations? A transparent agreement or joint 'declaration of principles' on these kinds of topics might smoothen the actual process and greatly improve the support for the end results.

Determine the geographic scope of the mitigation process

Different risks have different scopes. For example, flooding risks are clustered by river basins, landslides only occur in mountainous areas and forest fires only in forests. On the other hand various risks are not limited by any border, like a flu pandemic or nuclear fall-out. In any case most risks are not automatically confined to the artificial borders of a municipality, province, region or even a country. This



means that mitigation measures for different risks often have a different geographic scope. Therefore also mitigation plans can differ from each other: for flooding risk a mitigation plan on the scale of a river basin authority is much more logical than a mitigation plan on municipal level. Think carefully what is the appropriate scale for a mitigation plan and which networking partners have to be involved within that area.

Decide upon the lead partner

For different risks different (government) organizations are 'in the lead'. Mostly the primary government levels (municipalities, provinces, regions) are leading, but sometimes organizations like forest or water services dictate the mitigation process. This can lead to different mitigation plans for different organizations for a similar risk.

Think of who pays and who benefits

Ideally a part of the network analysis is to consider 'who pays and who benefits'. But do not wait with this until the phase of Cost-Benefit Analysis (see paragraph 5.2), because this is too late in the mitigation process. Therefore, consider payers and beneficiaries more in general at the start: what might the expected gains and drawbacks be in general? Knowing potential supporting and opposing partners helps to consider your strategy for involving them.

Maintain networks

Networking is a structural activity. If you only contact your network partners when you need them, this might arouse resentment. The trick is to stay in contact also in times when you do not need each other and build a structural relationship in which you can depend on each other. Be there for each other under all circumstances: help out when the other is in need. And above all: do as you say, because trust is not easily regained.

3.4 Getting started practically

The outcome of a network assessment should be a clear decision about which stakeholders should be involved in which stage of the mitigation process. In practical experience a useful first step is to organize a starting meeting with the most important partners. Goal of this meeting is to obtain support and reach agreement on the general principles of the process, like the shared objectives, responsibilities, obligations, mandates and decision process. It might be useful to describe all this in a 'declaration of principles', signed by the partners. With this agreement not only a solid basis is made for the mitigation project, but also for future cooperation afterwards.



Practical checklist for starting mitigation processes

- Determine which kind of mitigation process you are dealing with.
- Get a clear assignment of the political decision-makers on the goals, time frame, finances and conditions of the mitigation process.
- Perform a network assessment to understand the nature of the stakeholders you will be dealing with.
- Make sure you understand the legal responsibilities, obligations and mandates of all stakeholders involved and that you speak the same 'language'.
- Organize a starting meeting to obtain support of the stakeholders.
- Draft an agreement (declaration of principles) with the stakeholders on the goals, responsibilities, obligations, mandates and decision process.



4 Risk assessment

“We believe that with the knowledge of a risk assessment it is possible to establish priorities and implement mitigation measures to our main risks”



Sónia Gonçalves, forest engineer at the Civil Protection //
Mirandela, Portugal

The mitigation process begins with understanding the nature of risks. 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 literature⁷:

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

4.1 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> <ul style="list-style-type: none"> - Floods - Earthquakes - Landslides - Forest fires - Volcanic eruptions - Extreme weather (cold, heat, draught) 	<u>Technological risks</u> <ul style="list-style-type: none"> - 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>Social risks</u> <ul style="list-style-type: none"> - Civil disorder - Crowd panic 	
<u>Public health</u> <ul style="list-style-type: none"> - Outbreak of infectious diseases - Risks of long term exposures 	<u>Transport risks</u> <ul style="list-style-type: none"> - Airplane accidents - Nautical accidents - Train accidents - Traffic accidents

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/decision-makers 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 uses mostly will lead to a risk map of higher quality, but is not always desirable or even possible 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 uses 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 updated. 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 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. Risks 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.

Try to make a connection between risk mapping and spatial planning

The risk map is an useful tool to create an interconnection between risk management and spatial planning. The combination of localized risk sources, vulnerabilities and potential for disaster relief makes a certain area more or less desirable for spatial development. If these combinations of risk factors are presented properly on the risk map, this can be used to choose development areas more carefully. Moreover, if the spatial planners consider the risk map useful, it might help the safety professionals to get involved in spatial planning in the earliest stage.



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 km². 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.



4.2 Risk analysis

The second phase 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.⁸ The European Union refers to this definition, but focuses on assessing the probability and impact.⁹ 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 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



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.

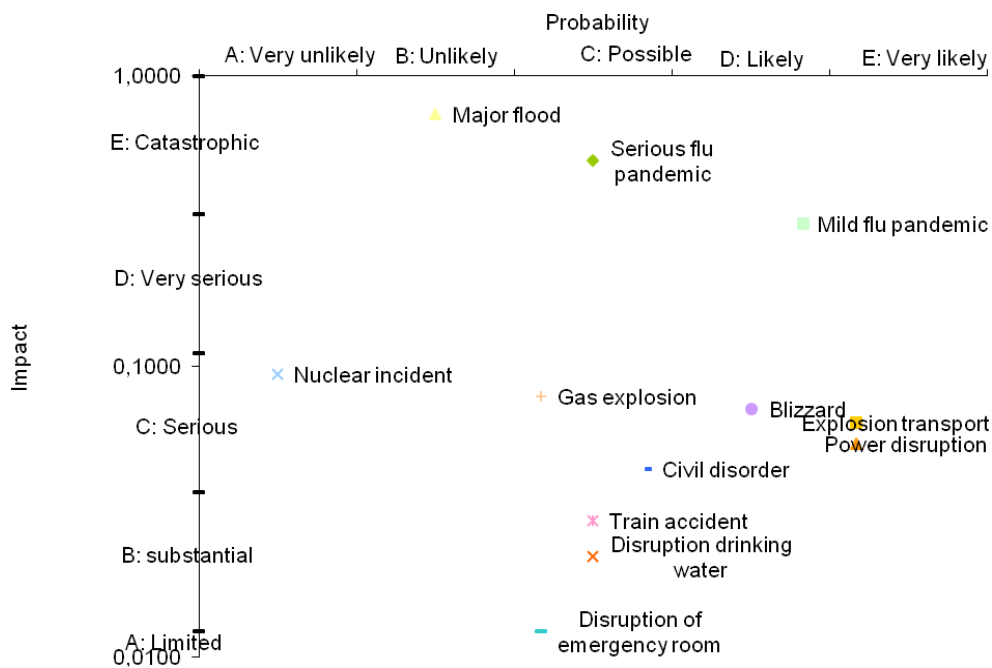
Registration and historical research also made it possible to project the spatial distribution of the yearly probability of forest fires on a risk map. On this risk map the territory also is divided into five classes of expected fire intensity, based on the land use, type of vegetation and the mountain 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).

is now also part of the joint approach to national risk assessment within the EU, as proposed in the *'Staff Working Paper on Risk Assessment and Mapping Guidelines for Disaster Management'*, in which also the MiSRaR project is mentioned.¹⁰ 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 Assessment¹¹, used by the national government, and in the guideline for Regional Risk Assessment¹², 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

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

identified 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 basis 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.



Example of a risk diagram



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 an 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.



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 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 collabora-



tion 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.

4.3 Risk evaluation

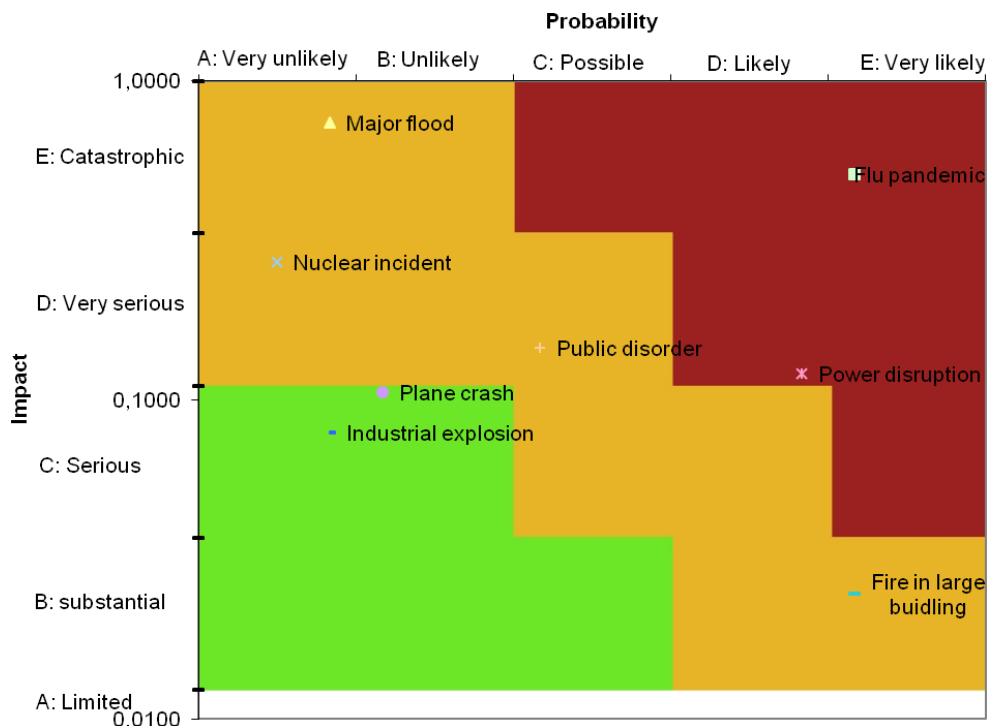
The third and final phase of risk assessment is called risk evaluation. In this phase, the conclusions of the risk identification and risk analysis are submitted to the (political) decision-makers. Risk and crisis management is not intended to achieve absolute security, but is part of a political-social 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. The aim is transparent and accountable decision-making: assessments are made as objectively as possible, but in the end politicians decide upon the priorities.

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 casualties 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.

Another way of helping politicians to decide on priorities is to literally 'colour' the risk diagram in order to depict different risk levels.



Example of a risk diagram with colours to depict possible priorities

4.4 Setting objectives for mitigation

The MiSRaR partners believe that the step of political consultation (risk evaluation) also should include a second aspect. Once insight is gained in the nature of risks and the political preferences regarding the prioritization of risks, the following step is to set general objectives for each of the chosen priority risks. In the context of MiSRaR an objective is defined as a (political) decision on a concrete policy for mitigation (and also disaster preparedness), in terms of a desired, measurable outcome on society. These objectives should be SMART:

- Specific: it addresses a concrete priority risk and contains a concrete objective.
- Measurable: the outcome on society can be measured, for example in percentage of risk reduction.
- Acceptable: the objective is acceptable for the decision-makers and stakeholders.
- Realistic: the objective can realistically be realized.
- Time bound: the objective is set for a concrete period.



This kind of political objectives is deemed necessary as a guideline for further identification and (cost benefit) analysis of mitigation measures, resulting in a concrete mitigation plan. Without insight in the political objectives there is a serious risk that the further technical assessment of mitigation measures is directed at the wrong kinds of policies. For example, in case of tunnel safety the experts might do research into life saving mitigation measures, while for the politicians maybe the most important is to prevent a tunnel from collapsing and thus inflicting serious damage to transportation and industries and the national economy in general. Without political consultation beforehand the technical research and expert judgement on mitigation might become useless.

On the other hand the expectations of such a political consultation on objectives should not be too high: without knowing the financial consequences of the final mitigation strategy it is not certain whether the chosen political objectives will prevail till the end of the mitigation process. Preferences might shift and even more so when the costs of the objectives prove to be high. Moreover, before the assessment of mitigation measures it cannot be known for certain which kind of measures will be most (cost) effective. The setting of objectives therefore must not limit the further technical research too much. There must be room for assessing other mitigation measures which not directly address the set objectives, for they might prove to be more desirable in the end. For this reason the setting of objectives should be restricted to the desired societal outcome and should not include actual concrete mitigation measures.

Examples of political mitigation objectives are:

"We want to reduce the probability of a catastrophic flooding on our territory from once every 1.000 years to once every 10.000 years"

"We don't want new vulnerabilities in areas with the highest landslide risk"

"We want to ensure that new spatial projects don't threaten the ecological value of Natura 2000"

"We want to reduce the number of forest fires with 30%"

"We want all our citizens to be self reliant for 24 hours in case of failure of the drink water system".

To be able to set such objectives the main political questions are: do we want to address the risk by means of risk management, crisis management or recovery management? In case of risk management: do we want to reduce probability, effects or vulnerabilities? In case of crisis management and recovery management: do we want to increase preparedness or resilience of the emergency services, or self reliance of citizens and corporations? And finally, which kind of impact – economic, ecological, physical – do we want to reduce?



Practical checklist for risk assessment

- Obtain the necessary information on current risk sources and vulnerabilities.
- Secure the continuous updating of risk information directly from the primary information sources.
- Produce risk maps and risk inventory lists.
- Determine which risk analysis method (single hazard or multi hazard) meets the needs of the mitigation process.
- Involve the relevant experts within the risk management network in the actual execution of the risk analysis.
- Produce a risk assessment report in which the political perspectives for risk evaluation are taken into account.
- Obtain clear political choices on the prioritization of risks and on political objectives.



5

Capability assessment

“To find the optimal mitigation measures elaborate analyzes are necessary. This requires a joint effort of the local risk partners. This kind of cooperation often results in the unexpected opportunities for mitigation.”

Christoforos Bezas, Director of Administration and Finance // Epirus, Greece



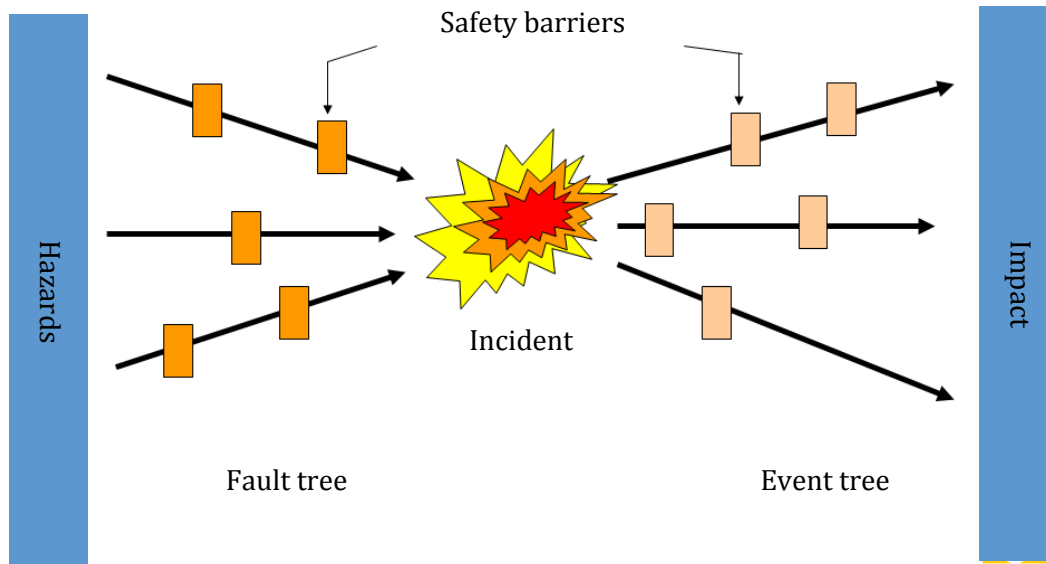
In the previous stages of the mitigation process insight is gained in the nature and severity of risks and the political objectives. The next step should be to perform a capability assessment, which by MiSRaR is defined as “the process of identifying, analysing and evaluating the risk management capabilities available to reduce the priority risks and also the crisis and recovery management capabilities to improve the disaster relief and recovery.” Capabilities in this case are defined as “all possible factors, measures and policies with which the risks can be reduced and the final outcome of disasters and crises can be influenced positively”. Important is that capabilities do not only refer to operational capacities like fire engines or ambulances, but also to mitigation measures, or in other words to all possible measures in multi-layer safety.

The purpose of capability assessment is to enable the political decision-makers to make strategic choices on concrete policies and measures that contribute to the chosen objectives. This is actually the phase that is all about the strategy: where are the weaknesses in our ability to reduce risks, and what can we do about it?¹³ The MiSRaR partners have found it most transparent to make a distinction in three parts of the capability assessment, similar to the risk assessment. These are discussed in the following three paragraphs.

5.1 Capability identification

The first step is that of capability identification. This is a follow-up on the scenario analysis performed for the risk assessment: by researching the scenario specific measures can be identified that contribute to the chosen objectives.

This means contemplating on the ‘causal web’ of an incident scenario in order to find possibilities for mitigation. This kind of analysis is called ‘fault tree analysis’ (FTA).¹⁴



In the ‘fault tree’ (also referred to as ‘bow tie’) resulting in an incident different possibilities can be identified to reduce the probability. This means analyzing the potential trigger events and safety barriers that might prevent a trigger event from leading to an actual incident. In the projected ‘event tree’ the potential measures for effect and vulnerability reduction can be identified, as well as possible measures for improved response and recovery. An example is the risk of forest fires. Highly flammable vegetation and a hot and dry season (causes), in combination with human carelessness or arson (trigger event) can create a fire (incident). The lack of preventive stopping lines (open spaces) and large amount of combustible materials due to lack of forest management can lead to the fast development into a big forest fire. The lack of fire brigades and accessibility routes may result in an uncontrollable fire. The direct presence of human habitation and industries (vulnerabilities) might in the end result in a disaster with casualties and a lot of damage. All these factors in the fault tree and event tree provide very concrete options for preventive measures. Another example is the flooding risk. A river bed clogged with sediments and low lands in the direct vicinity (causes), in combination with extreme rainfall (trigger event) might result in a flash flood (incident). The lack of water barriers and dikes means that the high water can flood the surrounding area. If there are people (vulnerabilities) living in this area and no passable evacuation routes, the impact will be severe. If the rescue services are ill equipped and people are not prepared, the impact could be catastrophic. Again this kind of ‘causal web’ provides plenty of opportunities for mitigation.

This fault tree analysis results in a list of all different potential measures, varying from concrete safety measures on site till general measures like public education to improve self reliance. The politically set objectives (see paragraph 4.4) might be used



to narrow the capability identification down to only those measures that might contribute to the objectives.

The MiSRaR partners have discussed on the different *spatial mitigation* capabilities for the main four types of risks for their areas: floods, forest fires, incidents with dangerous substances and landslides. These capabilities can be categorized according to the multi-layer safety concept, leading to the following overview.

	General spatial principles	Examples for floods	Examples for forest fires	Examples for dangerous substances	Examples for landslides
Proaction	Risk zoning: no vulnerabilities in risky areas (near the risk source)	Building restrictions in flood risk areas	Building restrictions in forests; Entrance restrictions in dry season	Safety zones around industries; Restrictions for transport through populated areas	Building restrictions on and beneath slopes
Probability reduction	Preventing trigger events	Dikes and levies Water buffer/ storage capacity	Clean forest concept; Prescribed burning	Routing of transport, separate high way lanes, safer junctions	Water drainage Nets and concrete structures
Effect reduction	Containing effects: building walls, separations etc.	Dike compartments Pumping stations	Fire protection lanes Watch towers (early warning)	Safety barriers & compartments	Retaining wall
Vulnerability reduction	Building safe, enabling evacuation	Building on higher ground Flood safe housing Higher evacuation routes	Building restrictions Evacuation routes Planting less flammable trees	Shock and fire proof building materials Appointing shelters Evacuation routes	Strengthened housing foundations
Response improvement	Enabling accessibility and operational conditions	Pumping stations Higher access routes	Water tanks/ reservoirs Water pipes Accessibility routes	Water screen system	Redundant accessibility routes
Recovery improvement	Combination of effect and vulnerability reduction in order to enable self recovery	Flood safe building concept	Planting fire resistant trees	-	-

5.2 Capability analysis and cost-benefit analysis (CBA)

The second step of capability assessment is researching the relative value of the identified capabilities. This may require the quantification of projected positive effects and ideally should include a cost-benefit analysis (CBA). CBA is defined by the EU as “a procedure for evaluating the desirability of a *project* by weighting benefits against costs. Results may be expressed in different ways, including internal rate of return, net present value and benefit-cost ratio.”¹⁵ The goal of a CBA is to enable informed decisions on the use of society’s scarce resources.¹⁶ CBA is within the EU quite commonly used, specifically nationally in the fields of infrastruc-

ture, environmental policy, traffic safety, spatial planning, external safety and also risk management.

To be able to incorporate a CBA in the mitigation process it is important that it is not limited to money value alone. The nature of (all hazard) mitigation is that different vital interests of society are taken into account: just like economical aspects also the societal costs of casualties or ecological damage should be considered. Therefore a CBA, or *Societal CBA*, also should incorporate information on effects (advantages and disadvantages) which cannot be put into money value.¹⁷ Because this requires a multi-criteria approach the expertise needed for a CBA is divers. For the calculation of vulnerability and actual potential damage in Euros in many cases extensive research is needed. This might not always be possible or desirable.

Besides CBA there are other methods for analyzing the merits of capabilities. By means of a cost-effectiveness analysis (CEA) the 'value for money' of different mitigation measures could be compared. Another alternative to CBA is a multi criteria analysis (MCA). In the MCA also qualitative judgments are given, instead of monetizing everything. Positive point of the MCA is the possibility to let political decision-makers set the relative value of the different criteria. However, both alternatives do not provide an overall review of the costs in relation to the benefits. For this reason in most cases a CBA is preferable.



Tips and tricks

Lessons learnt on cost-benefit analysis

Different kinds of expertise are needed.

The performing of a CBA to make informed decisions requires different kinds of expertise. It involves not only technical expertise on the mitigation measures itself, like knowledge on risk, crisis and recovery management and for example engineering, forestry, geology and geostatistics, but also specific economical and statistical expertise. This expertise is mostly not available within local governments and professional safety institutions.

The (un)certainty of the probability calculations is most defining for the CBA.

The probability of a risk has a very high influence on the outcome of a CBA. It makes quite a difference whether a structural investment into mitigation measures has to be valued against a scenario with a probability of for example once every 10, 100 or 1000 years. The problem is that the probabilistic estimation of risks is in most cases very uncertain. The macro-factors which govern the probability of a risk are significantly uncertain. When this uncertainty cannot be reduced the outcome of a CBA in many cases could go either way: positive or negative.

Specifically the probability of events related to the climate is difficult to calculate for a longer period of time, because of global warming. For example floods as well as rain and snow induced landslides are likely to occur more often in future. This



means with the ongoing discoveries and insights in global warming the outcome of CBA's on mitigation measures for those related disasters will have to be reevaluated continuously.

The validity of CBA's is mostly limited to specific locations and timeframes.

A specific problem is the spatio-temporal variability of risks, meaning the probability and impact of risks can be very different over time and for different places. This means a CBA in many cases is only valid for a specific location and timeframe and has to be repeated over and over to be able to make informed decisions for a larger area.

An all impact risk assessment requires an all impact CBA.

If for the risk assessment an all hazard approach is used, in most cases the impact will be assessed in terms of not just casualties, but also economical costs, ecology, social stability etc. In those cases it is necessary to take these same impacts into account in the CBA.

The risk diagram could be used to present the outcome of a CBA.

To present the outcome of the risk analysis, a risk diagram might be used. It would be best to be able also to present the outcome of the CBA in this risk diagram. In that case the decision-makers can really visualize for themselves what the projected reduction of impacts are.



Good practice

Province of Forlì-Cesena, Italy

Cost-benefit analysis for flooding and landslide risks

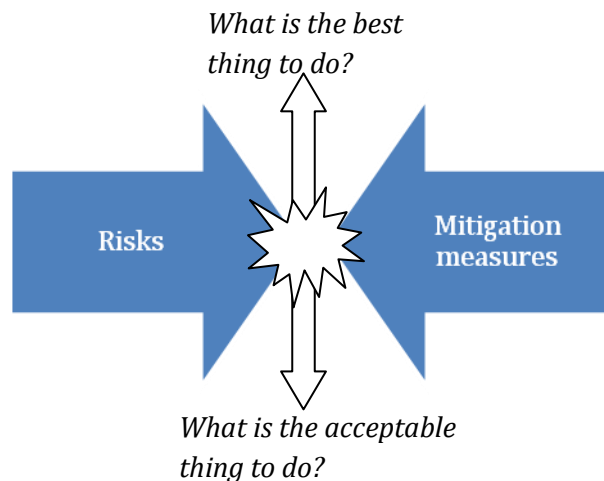
The Romagna River Basin Authority, an essential partner of the Province of Forlì-Cesena, has had practical experience with the performing of cost-benefit analysis. In the first instance the mitigation measures for the flooding risk of the Montone river near Ravenna were assessed. The identified best solution to prevent a flood was a combination of two main structural measures. Firstly the acquisition of extra space for the river channel over a stretch of 4 kilometers downstream of the threatened area. This required the shifting of the existing embankment by demolition and complete rebuilding. By this means the capacity of the river would be increased in order to prevent high waters upstream. The second measure was to place waterproof screens in the actual threatened area.

The total costs for the realization of the proposed measures were estimated at 12 million Euros. The structural maintenance was estimated at 100.000 Euros every 10 years. On the other hand the total costs of flood damage were calculated at 405 million Euros. Calculating with a probability of a flood once every 300 years and taking into account an estimated discount rate the total net benefit was calculated at 77 million Euros.

The second practical experience was with the landslide risks in the Santa Sofia area. To be able to make informed policy decisions on the prevention of landslides and/or to minimize the impact of landslides the basin authority is experimenting with methods for risk assessment and cost-benefit analysis. The total estimated costs of for the realization of some of the proposed spatial mitigation measures were calculated at 1.4 million Euros. The structural maintenance was estimated at 50.000 Euros every 10 years. The outcome of this CBA was negative: there was an expected net cost of 0.7 million Euros. Based upon this CBA the decision was made not to implement structural works. Instead the basin authority decided to issue a mandatory rule for territory management by the municipalities and Province. This rule prohibits new buildings in high risk landslide areas and requires new buildings in medium risk areas to be built on piles, with a maximum of 20% more buildings than the current situation.

5.3 Capability evaluation

The relation between the second and third step of capability assessment are best illustrated by the following figure. When confronting risks with possible mitigation (and preparedness) measures the first question that arises is: which are the 'best' measures? Answering this question is the goal of the capability analysis.



The second question is: which measures are most acceptable to the decision-makers? The best thing is not necessarily the most acceptable. This is the step of a capability evaluation: a comparison by the decision-makers of the possible measures on basis of their political criteria. The outcome of a cost-benefit analysis might help to objectify the political evaluation, but other political preferences and interest may always interfere. It is the job of technicians and experts to present the decision-makers with the relevant information, but the final judgment has to be made by the elected officials who are accountable. Therefore, in the rational

process of a CBA (informed decision) one always should consider that politicians might use additional criteria, like:

- Public and media pressure.
- Incidents in the (recent) past.
- Popularity of the measure(s), even if they are not effective.
- Quick wins in relation to the next election.
- The need to comply to legislation.
- Current value (such as developments) over future value (prevented damage).



Practical checklist for capability assessment

- Develop validated 'causal webs' for the priority risk scenarios.
- Identify measures in all levels of multi layer safety, using the causal web.
- Analyze the costs and benefits of the identified measures.
- Make a report (draft mitigation plan) with a proposal for measures.
- Take into account potential political perspectives for the evaluation of the measures.



6

Drafting a mitigation plan

“Risks and territory development are dynamic processes with different rhythms. Therefore, it is essential for successful mitigation that an active link exist between spatial and mitigation plans.”

Rita Seabra, architect in the spatial planning department // Aveiro, Portugal



The steps described in the previous chapters in the end lead to a (proposed) mitigation plan. Because there are different types of mitigation plans (see paragraph 3.2) no mitigation plan will have exactly the same content. However, based upon the outlined mitigation process and the practical experiences of the MiSRaR partners the following index may be suggested.

Chapter 1. Introduction

Every mitigation plan should start with a transparent problem definition. Why have the involved organizations decided to develop the mitigation plan? This may involve a general description of the risks within the area and the vital interests of society which are at stake, but also of the initial political decisions and the formal assignment of the mitigation project. Secondly the introduction should include a description of the objectives which were set at the start of the mitigation process. What was the intended result of the plan?

Chapter 2. Organization

At the outset of mitigation planning it should be made clear which are the responsibilities and mandates of the partners involved. In this chapter a general description of the legal framework should be given. Which national and regional/local legislation governs the mitigation process? What are the competences of the public bodies and private partners? Furthermore the mechanisms for the cooperation between the partners should be described. Which partners coordinate? How are information flows guaranteed? Which are the formal decision processes?



Chapter 3. Risk assessment

In this chapter the outcome of the risk identification, risk analysis and risk evaluation is presented. To provide practical insight in the risks it is advisable to include risk maps of the relevant risk types on a level that corresponds with the needs of the political decision-makers, main stakeholders and the general public. In case the mitigation plan is 'all hazard' the outcome of the risk analysis could be presented by means of a risk diagram.

Chapter 4. Objectives and mitigation measures

The risk assessment is followed by a capability assessment, based upon the objectives set by the (political) decision-makers. In the mitigation plan the outcome of this capability assessment is presented in (sets) of measures for each type of hazard within the scope of the plan. Depending on the scope of the plan (just mitigation or also crisis management and recovery, see also paragraph 2.3 on multi-layer safety) this may include measures in the following categories:

Risk management

- Proaction measures
- Measures to reduce probability
- Measures to reduce effects
- Measures to reduce vulnerabilities

Crisis management

- Preparation measures (safety zones, education, exercises, materials)
- Organizational description of the response and operational hierarchy
- Scenario procedures, task descriptions

Recovery management

- Preventive measures to improve the resilience and recovery
- Preparation of recovery
- Organization of recovery activities

The capability assessment itself, including the cost-benefit analysis, may be presented as a appendix or separate annex.

Chapter 5. Resources

For the implementation of the proposed measures funds and human resources are needed. In this chapter the financing and available working force are described.

Chapter 6. Public participation

The MiSRaR partners think that for a good mitigation strategy involvement of local society is crucial. A successful mitigation strategy should always involve some kind of self reliance and risk communication. This is important enough to justify a separate chapter in the mitigation plan. This chapter could include measures by the public,

communication on risks, accountability for the residual risk and procedures on public participation in the decision and implementation process.

Chapter 7. Updating paragraph

A mitigation plan should never be static. New risks and other developments should be identified timely and results from the actual implementation of mitigation measures may require updating of the plan(s). Therefore it is suggested that in a separate chapter a description is given of the responsibilities concerning the making, evaluation and updating of the plan. This may include a procedure for evaluation, the collecting of feedback and research into the resulting outcome. Also it is suggested that the mitigation measures and policies for disaster preparedness are tested in practice by means of operational exercises. This may be a useful basis for future updates and new mitigation processes.

Appendices

In the appendices the list of receivers of the mitigation plan and an overview of the full legal framework and relevant official documents can be included.



Tips and tricks

Lessons learnt on mitigation plans

Decide in advance what different kinds of expertise are needed to draft a plan

A mitigation plan includes the results of the different steps described in the previous chapters of this handbook. The execution of these steps requires a great variety of knowledge and expertise. Logically, also for the drafting of the actual plan different kinds of expertise are needed. One approach is to compose a group of writers with different competences. However, the author or authors of a mitigation plan needn't necessarily be experts in the field themselves. In some cases it might even be helpful to appoint a 'neutral' secretary with no attachment to a specific field of expertise to write the plan. Firstly, such a neutral author is often in a better position to determine what information serves the purpose of the plan best and what 'language' should be used. Secondly, a neutral person might improve the support of the partners involved for the end product, because he or she is not affiliated with a specific interest. In any case it is advisable to contemplate on these questions in advance and discuss it with the relevant mitigation partners.

Make use of existing plans

As described in paragraph 3.2 there are different types of mitigation processes and it is always important to try to incorporate safety in related processes like spatial development. A very effective way to devise a 'mitigation plan' is therefore to include risk management in existing plans, like spatial plans, disaster preparedness plans or policy plans for local economic development. Especially the correlation with spatial plans is very important. The objective could be to incorporate risk management in every spatial plan, regardless whether a separate plan is drafted



specifically for mitigation. Another option is to combine mitigation with existing emergency plans. In this way risk management and disaster management can be described coherently. Finally, depending on the local situation there are many other policy plans conceivable, in which aspects of mitigation might be incorporated.

Implement in partner plans

It is important not only to implement mitigation in the various policy fields of the competent local authorities, but also in the policies of all relevant public and private partners. Therefore, try to convince partners to incorporate the joint mitigation objectives and measures in their own plans, or at least to make a clear reference to the joint mitigation plan.

Devise a communication strategy for the plan.

Implementation of a mitigation plan requires action by many partners. It is therefore important that these partners and also the general public are made aware of the existence of a mitigation plan and how it relates to themselves: what kind of implementation actions is expected? For this reason a mitigation plan should be accompanied by a communication strategy. Consider that different target groups might need different information and a specific 'language'. See chapter 8 for more lessons on involving partners and the public.

Keep the plan concise

The nature of the process steps and required assessments makes the full width of a mitigation plan quite extensive. In accordance with the communication strategy it should be considered what information should be incorporated in the plan for which target group. In general it is advisable to keep the plan as concise as possible. Therefore, put extensive analyzes in the appendices and make a short abstract with the main conclusions.

✓ **Practical checklist for the drafting of mitigation plans**

- Combine the results of the previous steps in the mitigation process into a mitigation plan (or mitigation chapter in other plans).
- Make a communication strategy for the mitigation plan.
- Consult the relevant partners about the plan.
- Present the plan to the competent decision-makers to be formally enacted.
- Send the definitive plan to the relevant partners, in accordance with the devised communication strategy.
- Ask the mitigation partners to include the relevant parts of the mitigation plan in their own policy plans, or to make references.
- Agree upon periodic updating of the plan.



Good practice

Region of Epirus, Greece

Mitigation planning for frost and snowfalls

The Region of Epirus is located in the north-west part of Greece. The problems of snowfalls and frost are two of the main problems that the Civil Protection has to deal with in Epirus, during winter. Low temperatures result to ice on road, making driving extremely dangerous, while heavy snowfalls can make villages in the mountains and farms with live stock inaccessible.

In Greece mitigation planning is divided into three different levels, which all take into consideration 'multi-layer safety'. On the highest level, there is the General Plan for Civil Protection named "KSENOKRATIS". Ksenokratis is the general frame for the protection of natural environment and people's lives, health and fortunes from all kinds of disasters, both natural and manmade. A list of potential disasters is provided, while the plan refers to the whole country and to all levels of public administration. On the middle level there are the plans/guidelines from the General Secretariat of Civil Protection. Each one of them refers to a specific kind of hazard and can be applied to the whole country. Of course, those guidelines are in accordance with Ksenokratis. On the lowest level there are the plans on regional/local level. Those plans are based on the guidelines of the General Secretariat of Civil Protection and take into consideration the vulnerabilities and the needs of an area. Many partners, such as the Region, the Municipalities, the traffic police, the fire brigade, the army, volunteer organizations, enterprises etc. are involved in the implementation of these plans.

The plans for frost and snowfalls specify the actions that should be implemented during three different periods: the pre-winter period (April-September), the preparedness period (October) and the winter period (November-March). The mitigation plans give an outline of the competences of all the involved organizations and public bodies, while the 'memorandums of actions' of the partners involved answer who does what, when, how and why. Another important aspect is the public risk awareness, for example on protection measures villagers and farmers can take for themselves.

7

Financing mitigation

“The financing of mitigation requires smart allocation of existing resources. Through close cooperation between all the involved public and private organizations it is possible to create win-win situations and keep costs low.”

Guglielmo Russo, vice-president // Province of Forlì-Cesena



Of course the first necessary condition for implementation is to organize the required resources. Once the objectives and concrete mitigation measures of a mitigation plan have been set, the involved partners need to know what contribution is expected from each of them. In the end this comes down to the actual allocation of budgets, but also to the ensuring of the proper involvement of professionals and deployment of material resources which are already available.

A general lesson of MiSRaR is that insight in different kinds of mitigation budgets is not gained easily. The budgets labeled explicitly for mitigation measures are few, but at the same time mitigation measures might be financed from many different other general budgets, which do not specify the amount used for risk prevention. Overall the knowledge exchange between the MiSRaR partners has shown that the allocated budgets for mitigation vary greatly between each country, not only in actual amount but also in relative size compared to other government expenses. In any case the total amount of budgets specifically labelled for actual mitigation proved to be relatively small in comparison with spatial and infrastructural development budgets. While development mostly is measured in billions, the mitigation budgets are limited to millions. On the one hand this is understandable from the point of view of overall societal impact, but on the other hand it shows that financing mitigation measures as part of a spatial or infrastructural development project could be ‘peanuts’ on the total project expenses. From this perspective sometimes it could be surreal to negotiate with a town council or national ministry about for example a small budget for safety measures along a railroad, while at the same time the contracts with the companies that build it are hundred or thousand times larger.

This is all the more an issue for discussion because at the same time many risks are specifically caused or enlarged by spatial and infrastructural developments. This is

not only the case when developments result in a new ‘risk source’ (like an industry or intensified transport of dangerous goods), but also when new vulnerabilities (like housing or schools) are built closer to existing man-made risks or in the potential effect area of natural hazards. Therefore a general conclusion should be that more thought has to be given to the rules that govern the extent to which safety measures are a part of spatial and infrastructural developments, also financially.



Tips and tricks

Lessons learnt on financing

Incorporate mitigation in other budgets and create public-private partnerships

A major success factor for the financing of mitigation is to try to incorporate safety measures in projects financed from other budgets. This is not only a matter of ‘pay for the risk you cause’, but also of cost reduction by incorporating measures as a part of other building activities. For instance, during the reconstruction of a road, it could be heightened above the projected flood levels to function as an evacuation route. Or a wall to deflect noise from a highway could at the same time be used to constrain the effects of an explosion. The possibilities for combining safety measures with necessary building activities are endless, if at least the partners are willing to consider them. This requires close cooperation between public bodies and often also public-private partnerships. This brings us to the second lesson.

Search for shared interests and win-win

Another success factor for finding finances is to create strong alliances between public institutions and also public-private partnerships. To convince the competent public bodies and even private companies to reallocate budget from other sectors or projects to risk mitigation measures, it is important to define “what’s in it for them”. Try to find shared interests in the measures. For example, a foresting company should easily understand the necessity of fire prevention measures, because the forest itself is part of their commercial value. Likewise a national government should be able to understand the necessity of safety measures to prevent for example the total loss of infrastructure due to an incident with dangerous goods, not only from the point of view of prevented casualties, but also because the measures reduce the potential damage to the national economy as a whole. However, forming alliances goes beyond just finding shared interests. It is also about defining actual *win-win* situations: even though the interest might not be shared, certain mitigation measures might contribute to different goals at the same time. For instance, reduction of existing risks might increase land value and opportunities for further development, or joint disaster preparation with environmental protectors might improve nature conservation.

Organize early involvement

Finding shared interests should be considered as early as possible in the process. Ideally it should be part of the project assignment and discussed at the outset of the

first project meeting (see chapter 3), both in projects directed at spatial development and in processes primarily directed at risk mitigation. A second step is to cooperate on the risk assessments, in order to build a common understanding of the problem and increase risk awareness. It is advisable to involve relevant partners in the stage of objective setting at the latest, so there is an opportunity to confront the political objectives from the point of view of safety with objectives directed from other interests.

Make use of the insights from a CBA

It is advisable to perform a cost-benefit analysis to find the right mitigations strategy. Such a CBA also helps to define the financing options for a mitigation plan. On one hand the CBA provides actual insight in the initial investment costs to implement the safety measures, the structural maintenance costs and the period over which the costs have to be discounted, helping to define which budgets have to be available at which time. On the other hand a CBA also shows which party will benefit in what way from the measures. To find a proper financing construction it might help to consider the balance between 'payers' and 'beneficiaries'. If a certain sector or interest group has a lot of projected benefits it is only logical to demand for a contribution in the mitigation strategy. However, this might not always be necessary in advance: another option is to agree upon the reinvestment of benefits in future mitigation project. These kinds of solidarity from beneficiaries might also convince the 'payers' to play their part.

Organize cooperation across administrative borders

A difficulty for applying a 'solidarity principle' as described is that in many cases the benefits are at another (territorial) level than the costs, just like risks themselves in most cases do not follow administrative borders. For example, in case of river floods mitigation measures upstream might reduce the risk downstream. Or a specific safety route for transport of dangerous goods might lead to a reduced risk in one part of a territory, but an increased one in other parts. This kind of 'distribution' problems requires cross-border cooperation and financing constructions between local governments, but also between national governments of EU member states. This is not an easy task, because the natural tendency is to cling to formal responsibilities of public bodies for their own territory. This brings us to another success factor for implementing mitigation strategies: networking, which is discussed in the following chapter.



Good practice

Province of Forlì-Cesena, Italy

Public-private partnership for financing

During the last fifty years a great urbanization has taken place along the river Savio in the Province of Forlì-Cesena, deteriorating the natural conditions of the river. The frequency of flooding has increased and between autumn and winter floods are more and more likely to happen. The Regional Basin Authority wrote a Draft Plan concerning Hydro-geological Risk. An effective mitigation measure considered in this plan is the stocking of water in temporary basins (detention basins) during heavy rains. However, installing detention basins can be difficult due to financial reasons, specifically the need to raise public money - which is less and less available - to logistic reasons, specifically because it is difficult to find areas wide enough in an urban context, and lastly because of administrative procedures in case the Public Administration needs to acquire a private area if the infrastructure is to be developed in non-public areas.

To overcome these problems use was made of the so-called Extracting Activities Interregional Plan (P.I.A.E.). The P.I.A.E. governs the planning of extracting activities (i.e. quarries) within the Province. According to the Regional Law 17/91 concerning the rules on extracting activities, which regulates the sector, the P.I.A.E. must include the criteria for the final destination of the quarries once the extraction is over, in an attempt to restore the environment and implement the social and the public use of the area. The private subject that makes a profit from the use of the area must carry out specific final works.

The Province and river basin authority agreed to use the P.I.A.E. to identify areas that, after the extractions, will be used to decrease the hydraulic risk and increase the regulations of the river rate of flow. Because of the existing obligations making the extracting area suitable as a detention basin to restrain flooding water has to be carried out by the private owner at its own expenses. This obligation is dealt with and enforced by the agreement entered by the public body (Municipality) and the private subject while defining the terms of the authorization.

Thanks to this kind of public-private partnership, it has been possible to overcome the main difficulties for the construction of the detention basins (funding, expropriation of private areas, etc). The coexistence of extracting activities and safety-interventions on rivers helps to reach the goal of limiting the consumption of resources and land by rationalizing the use of both natural resources and public money. The Province of Forlì-Cesena experience led to a change in the Regional legislation, specifically the introduction of an article on norms for a rational use of the resources.



Practical checklist for financing mitigation

- Start with an assessment of the existing (local, national, international) budgets for mitigation, disaster management and spatial & economic development.
- Analyze the CBA to see who pays and who benefits.
- Define the shared interests.
- Build a 'coalition of the willing' of partners which want to cooperate on mitigation (see also chapter 8).
- Try to incorporate mitigation activities in different budgets.



8

Lobby & advocacy

“For successful mitigation it is indispensable to create close co-operation between local organizations and to build strong cross sector alliances.”

Karin Tammemägi, Chief North-Tallinn District // Tallinn, Estonia



8.1 The necessity of lobby and advocacy

In order to ensure that decisions are made on mitigation policies and to improve cooperation and implementation of a mitigation plan it might be necessary to devise a lobby and advocacy strategy as part of the mitigation process. *Advocacy* is the process of attempting to influence public policy and resource allocation decisions within political, economic, and social systems and institutions. *Lobby* is a specific form of advocacy which attempts to influence decisions on legislation and regulations. The MiSRaR partners have found that in some cases advocacy is not only directed to influence public policy, but may also be aimed at influencing policies of private organizations. From the perspective of local governments which bare responsibility for safety, the influencing of private partners to ‘do their part’ is in fact quite important.

A popular believe is that lobby and advocacy are more or less ‘perverse’ activities, because they are often motivated by commercial interests. Of course there are ample examples of private companies influencing public policy for their own benefit. On the other hand, lobby may be motivated from moral, ethical or faith principles which are not as down to earth as just personal gain. In the general perspective of a good functioning democracy lobby and advocacy practices are part of the ‘balance of power’, ensuring that conflicts of interest are addressed politically. In the case of mitigation often the underlying conflict of interest is that between the fundamental vital interest of society: safety versus economy or safety versus ecology.

Another reason why lobby and advocacy processes are important for mitigation is the fact that no single public body holds responsibility for all parts of mitigation. To be able to implement mitigation strategies cooperation of a whole range of stakeholders



is necessary. This means that a great deal of persuasion is needed to get every stakeholder to conform to the shared objectives and contribute for their part in the implementation. As described above, in many cases even actual budgets of other stakeholders are needed, for which advocacy may be quite necessary.

Some examples of lobby and advocacy

- media offensive
- public speaking
- participation in (public hearing) committees
- publishing (scientific) research
- publishing memos, brochures etc.
- public polls/referendum
- field trips to explain the issue to decision-makers
- consultations/meetings between decision-makers of various entities
- incorporation of decision-makers early in the policy process (i.e. in a steering committee)



Tips and tricks

Lessons learnt on lobby and advocacy

Shared interests and goals

Convincing partners in your network requires sincere interest in their needs and a shared understand of the problem at hand. Again, like described in the chapter about financing, it is important to really consider all possibilities for finding shared interests and goals. To form an alliance it's not always necessary to agree on everything: one shared interest might be enough to cooperate on a specific policy for a certain period. Therefore, narrow issues down till the point you can reach agreement. A partner might in general be opposing costly prevention measures, but in a specific case nonetheless might be convinced that it is in their own interest.

Organize networking expertise

The competences for networking and relation management can be quite different from the traditional competences of safety professionals. Professional risk expertise might in some cases result in an obstinate attitude towards partners that “do not understand” the necessity of risk management from the outset. It therefore is important to be aware of the different roles which have to be played during a mitigation process and the different competences needed for that. This is all the more an issue when networking transforms into actual lobby and advocacy for specific mitigation strategies.

Be aware of lobby and advocacy processes

Safety often is in conflict with other vital societal interests. Mostly different interest



groups and entities are trying to influence public policy simultaneously. Especially for economical and commercial interests lobby and advocacy are traditionally quite common. For civil servants working on safety and spatial planning it is advisable to be aware of lobby and advocacy processes in their surroundings. Take into consideration that you may be subject of lobby by others, but also that you can play your own role in convincing the responsible politicians of the importance of risk mitigation.

Be prepared and create 'windows of opportunity'

Lobbying and advocacy is about creating 'windows of opportunity'. Seize the opportunity when public concerns arise or incidents occur and try to put mitigation on the political agenda. Be prepared for such occasions by preparing a dossier with objective information ('facts and figures') about the risks and a clear overview of professional opinions. Also think about a public spokesperson. For example, when advocating to national government for specific mitigation measures, a Mayor or Governor could function as public spokesperson on behalf of an alliance of safety partners.

Advocate for risk awareness

Support for mitigation begins with understanding the nature and extend of risks. Advocacy should therefore also include interventions to ensure risk awareness, both of the general public and of key stakeholders and political decision-makers. This proves the importance of a conscious consideration of advocacy actions during the whole mitigation process, not in the least during the risk assessment phase. Involving stakeholders (including the general public) in the assessment of risks increases their understanding and support.

Advocate for public-private cooperation

For almost all mitigation plans close public-private cooperation is needed. Advocacy processes should therefore take into account actions to improve understanding on the necessity and further willingness to cooperate.

Aim to influence political paradigms

Advocacy on mitigation should go further than just the objectives of a single mitigation plan. As discussed before, it is important to establish safety as an important factor in spatial and economic development altogether. This means altering the political paradigm in such a way that early involvement of safety in spatial processes is considered as a benefit rather than a cost. Also it might be necessary to advocate for more attention for mitigation rather than just disaster relief.

Aim to influence professional paradigms

Mitigation should also become part of the paradigms of professionals and civil servants which do not work primarily in the field of safety, such as spatial planners. Sometimes it might be 'comfortable' for them to let the ownership of safety issues



remain with the primary safety experts. From this perspective having a separate mitigation plan might sometimes even be counterproductive. To avoid this all related sectors should consider how they relate to safety and what they can do within their own field of expertise to improve mitigation. This requires constant advocacy for risk management and close attention to taking people along in the mitigation process.

Lobbying in national and EU legislation might prove to be effective

In most countries risk mitigation is not yet an integral part of legislation on spatial development. If this could be achieved the effect would be far greater than just advocacy for the implementation of one local mitigation plan. Paradoxically, elaborate existing legislation sometimes thwarts common sense cooperation. Of course, formal safety rules are observed if proper monitoring and enforcement is organized (see further on), but while safety rules are meant to set the minimum safety level, they might unintentionally make the minimum to the maximum. After all, why should additional mitigation measures be taken into account, if all formal requirements are met? The problem is that fundamental opportunities for risk mitigation in many cases arise outside of formal legal obligations. For this reason the main aim of a lobby on national and EU legislation should be to ensure early involvement of safety issues in spatial development processes.

Form alliances

For any kind of lobby and advocacy strategy a strong coalition of different partners greatly improves the chances for success. Together you stand strong! Traditionally local and regional governments work together to influence national mitigation policies. However, the effectiveness could be increased if in these kinds of advocacy processes also public-private partnerships are realized. This might be an alliance with development agencies or industries that concur with the public aim of risk reduction, but also with universities and scientists that provide the objective information about risks and prevention measures. Moreover, citizens that are worried about physical safety in their surroundings can be a strong alliance partner (see also the chapter about public participation).

Empower others

As a safety professional often it isn't necessary to take part in the public debate yourself. Empowerment might be far more effective: help others to influence policy by providing the necessary objective information, bringing them in contact with the right stakeholders and help to translate your shared objectives in terminology understood by the decision-makers.

Consider to make ecology a 'natural' partner of safety

Like safety also for ecology the most important opposing interest is that of economical and commercial gains. However, ecology might become an opposing force in mitigation processes when contradictory interests with safety are not made trans-



parent. This is mostly the case with natural hazards, like forest fires and floods, for which certain mitigation measures might be opposing to (traditional) methods for nature conservation. Furthermore in areas where safety risks meet with natural conservation areas the overall risk awareness of ecologists isn't optimal, sometimes resulting in arduous disasters preparation. This must be prevented, also because ecology is a strong lobby force with a lot of public support. To strengthen the relations between both fields it could be taken into consideration to form coalitions of organizations for safety and ecology. Locally this can be done for specific risks. Nationally and internationally the global warming could be a joint basis for coalitions, because it can gravely increase both the probability and the impact of disasters. Moreover it could be considered to set a legal obligation (by EU directive) to include a safety paragraph in Natura2000 management plans.



Good practice

EPF, Bulgaria

Conflict of interests for NATURA2000

For the safekeeping of a Natura2000 area a risk assessment was made. Extensive research and risk mapping with GPS coordinates was needed to be able to comprehend the full extent of the threats to the protected area. However, it was found that the protection against safety risks may sometimes conflict with traditional natural conservation, which is the main aim of NATURA2000 management plans. The conservation might for example call for an undisturbed life cycle of the forest, while forest fire prevention might involve the cutting of dead trees, removal of dead branches or even creation of bare areas as a 'stopping line' for forest fires. Close cooperation between natural conservators and emergency services proved to be very important for mutual understanding about these potential 'conflicts of interest'.

Also during an incident there might arise a conflict between nature conservation and crisis management. The actual operations of emergency services during an incident, like a forest fire, might inflict substantial damage to the protected area in a short period of time. Fire trucks and fire fighters might for example crush endangered flora and fauna. Therefore, to prevent unnecessary damage to the protected area a joint mitigation strategy from both the perspective of safety and nature conservation should also include close cooperation with the emergency services and specific preparation, like guidelines for operations.

These insights in the different interests from the perspectives of safety and nature conservation proved to be valuable for building a close cooperation between the local partners and for advocating about mitigation.



8.2 Public participation

A general lesson of the MiSRaR partners is that before planning mitigation measures, the capability assessment process must necessarily take into consideration not only the physical and environmental factors, but also the social aspects linked to the acceptability of the final solutions. In other words, public opinion should be taken into account and compared to the expert judgement of mitigation policies. For this public participation in the mitigation process is a necessary precondition.

Public participation is important for more than just this one reason. For a start public participation is an important instrument for increasing risk awareness. By participation in discussions on risk mitigation inhabitants learn about the objectively assessed physical safety risks. Furthermore participation during the design of a mitigation strategy is a necessary starting point for implementation of measures by people themselves. The combination of public participation and risk education helps to inform citizens about what they can do to prevent incidents, should do during an incident (resilience and self reliance) and may do to accelerate recovery afterwards. If properly organized the public participation should increase the acceptance of measures and willingness to take public action.

There are many different ways to organize public participation. In most countries public participation is partly regulated by national legislation, for instance requiring local governments to inform and/or involve inhabitants in certain stages of developments. However, it is advisable to go beyond these formal requirements and consider ways of participation that are appropriate for the specifics of the risk at hand and the involved target groups.



Tips and tricks

Lessons learnt on public participation

Distinguish target groups in your network assessment

Take different kinds of public (interest) groups into account in the network assessment. Who lives directly in the neighbourhood of a risk? Who has commercial interest, like tourism, businesses and farmers? Which are local interest groups that proved to be important in the past?

Organize participation during every stage of the mitigation process

From the first outset it is important to involve people. Let them know the government will start to think about risks. Let them participate in the risk assessment and contribute local (historical) information from their experience and memory, let



them help to set the criteria for the risk evaluation, have a transparent setting of political objectives and above all let them participate in the designing of a mitigation strategy and find win-win situations between mitigation and their own local interests.

Consider the confidentiality of information

During the risk mitigation process information might arise that is confidential, like the assessment of security risks and terrorism or specific risk information about industries. The formal requirements differ for each country, but always it is advisable to consciously consider in advance what kind of information you can and cannot reveal.

Choose different instruments and be flexible

The insights gained from the network assessment might result in for example installing one or more 'focus groups' that can supervise the whole mitigation process and provide continuous insight in public opinions on the risks and mitigation measures. Other options for public participation are organizing public discussions, information campaigns and education. Different groups might require different approaches. Be flexible during the process and if proved necessary change your tactics.

Make use of liaisons to target groups

The 'government' in general is not always the best and most accepted sender of messages to the public. People decide for themselves who they think is the most authoritative. Consider who might be the most influential liaison to different target groups, like local opinion leaders, key players in civil society, priests or the boss at work. Try to approach target groups 'on their own turf' and in their own 'language'.



Practical checklist for lobby and advocacy

- Lobbying is about creating 'windows of opportunity': make use of public concerns, incidents and the political agenda.
- Be prepared: have a lobby dossier and public spokesperson for when an opportunity arises.
- Form coalitions by means of your network assessment, CBA and win-win situations and empower your coalition partners.
- Empower others to speak.
- Find a spokes person.
- Communicate in facts and make use of scientific research.



Good practice

Province of Forlì-Cesena, Italy

Public participation in flood mitigation

On 6, 7 and 8 October 1996, some areas belonging to the Provinces of Bologna, Ravenna, Forlì-Cesena and Rimini faced extraordinary rainfall that brought about huge floods and extensive damage to people and buildings. After the event, the Government declared the emergency state and a plan for emergency infrastructures was adopted and then modified later. At first a new canal was being designed which would deviate four existing canals. When the project was presented to the local population, it did not raise very much appreciation. Local residents (as individuals and as categories) were not sure about the effects on the nearby town of Cervia.

Public involvement in the project led the decision-makers to take into account the interests of the different categories into consideration. At first the project was purely engineering aimed at guaranteeing the draining of extraordinary rains with a return time of 200 years, but in the end it was modified to encompass other local interests. It was decided to combine the reshaping of an existing canal with 'water detention basins'. The benefits of this alternative were lower costs and smaller environmental, social and economical impact. Moreover, the detention basins would allow the purification of polluted waters by means of the sun (phytoremediation), from which not only the nature would benefit, but also the beach tourism on which most of the local economy relies.

The public participation turned out to be positive both for the interest groups and the community as a whole. As a result a good level of safety in the territory was ensured and the areas occupied by business activities were maintained.

9

Monitoring & enforcement

“The step from mitigation planning to actual implementation of safety measures can be very challenging. Good monitoring of the effectuation and enforcement of regulations is always indispensable.”



Mihaela Stoyanova, regional development expert //
Euro Perspectives Foundation, Bulgaria

A mitigation plan can only be effective if the correct implementation of the measures is ensured. For this the continuous monitoring of implementation is needed. When the monitoring reveals shortcomings in the implementation, enforcement of legal obligations and formal agreements is often a necessary next step. According to the MiSRaR partners for proper monitoring and enforcement attention for the following issues is required.

Changing political preferences

Public representatives and political executives often hold office for only four to six years. However, mitigation policies in many cases are more long term. This means that during the implementation process the political coalitions may change and political preferences concerning mitigation may shift. One of the tasks of civil servants and technical experts is to monitor the consequences of new policy programs for the existing mitigation plan(s). In some cases a mitigation strategy might even be stopped, but in most cases the changes to mitigation measures will be more concealed. Important is to signal cases where the failed implementation of one measures may result in the complete failure of the mitigation strategy. For example, in the case of Cesenatico case (see cadre) the by-pass canal will only be effective if the flooding areas are realized. There always is a risk that after the realization of the most visible measures (in this case the bypass canal and sliding doors), the more long term and less visible measures (in this case the flooding areas) will be disregarded in future.

Monitoring and evaluation in a network

Like discussed before, the mitigation process involves many institutions with different responsibilities. Also the implementation of mitigation measures requires good cooperation, often with several private bodies. In such a network it is important to



reach agreement in advance on the process of monitoring and evaluation. Which public body makes use of which formal mandates? Do all partners accept the role of monitoring (and potential enforcement measures) by, for example, the municipality or province?

Formal judicial instruments

Government offices hold different legal mandates for monitoring and enforcement. In case of criminal negligence the penal code may be applied. In other cases public institutions may enforce the implementation of measures by means of formal directives or instructions and even giving fines to for example building companies. In case of inter-governmental cooperation this may sometimes be more difficult. For example, it often is 'not done' for a municipality to give formal directions to national public bodies.

Ensuring implementation of mitigation measures by citizens

Often a mitigation strategy will involve some kind of measures taken by citizens themselves. For example, the prevention of forest fires may include actions of inhabitants to keep their premises free of combustible materials, or increasing resilience in case of extreme weather may require emergency supplies of water and food in private homes. The implementation of these kinds of measures requires specific attention of the government. In this case it is often more difficult for public agencies to use formal mandates. Investing in risk awareness and concrete instructions on how to act (preventive, preparations and during an actual incident) may be more effective.



Practical checklist for monitoring & enforcement

- Analyze the legal mandates for monitoring and enforcement by the public partners involved.
- Agree upon the use of formal mandates.
- If necessary, incorporate certain additional safety regulations in local regulations and codes.
- Organize the right capacity and expertise for structural monitoring.
- Try to balance administrative penalties with enforcement by criminal law.



Good practice

Municipality of Tallinn, Estonia

Monitoring and evaluation of snow and ice cleaning

In Tallinn the fierce winters create a serious risk of accidents due to snow and ice. For this reason there are regulations for owners of the buildings and for the regional and municipal government to clean the pavements and roofs from snow and ice. To be sure of implementation of the necessary measures monitoring and enforcement are very important. For example, building owners are required to take the following mitigation measures:

1. Heat insulation of their roofs to avoid icicles. For this purpose thermographic pictures with thermocameras should be made, which show the flaws in heat insulation.
2. Constant cleaning of snow from the roofs. For this special safety equipment should be available.
3. Installing electricity cables to the rain water pipes to avoid them from freezing. Also it is forbidden to use chemicals in melting the ice and snow because it can drip to the water collectors and cause lot of damage to the bacteria in the waste water cleaning stations.

To enforce these measures the municipalities are required to actively inform the owners about the aforementioned responsibilities and about the sanctions and fines in case they do not take the necessary measures. The police is instructed to monitor the situation and take action when necessary. The police will start with reminding people of their obligations and will in the end give fines in case of prolonging negligence. Furthermore the municipalities have to create an overview of the buildings where the heat insulation of the roofs is insufficient and support the owners with the improvements.

The yearly implementation of the mitigation strategy includes a lot of different safety regulations and requires close cooperation between the municipality, police, public transport and several other organizations. In the detailed practices description a complete overview of all measures can be found.

10

Evaluation & feedback loop

“Mitigation is a continuous process. The implementation of measures automatically should start a new round of risk assessments.”

António Branco, Mayor // Mirandela, Portugal



10.1 Evaluation of the mitigation process

A traditional way of explaining policy processes is the so called Circle of Deming, which consists of four phases, also applicable to the mitigation process:

- Plan: develop a mitigation plan
- Do: implement the mitigation measures
- Check: monitor the implementation
- Act: act on the deviations/problems

The final part of any policy process should be a ‘feedback loop’ to the beginning of a new process. Mitigation planning is an extensive process which involves a network of different partners and a lot of different expertise. Of course, during such a process many lessons will be learned, which may be useful for new mitigation plans in the future. A joint evaluation of the whole process provides a professional closure, which may improve the willingness for future cooperation with the risk management partners. A possibility is to include a specific chapter or paragraph on these kinds of monitoring and evaluation in the actual mitigation plan.

The organisation of an evaluation process requires specific attention. For example, to ensure proper learning it is advisable to use independent evaluators, in order to avoid ‘blind spots’ in the observations and to be sure that the lessons will be accepted by the participants. Furthermore the evaluation should preferably be externally directed, meaning that also the mitigation partners can express their thoughts. At the same time confidentiality should be guaranteed. If not, the evaluation could become threatening or at least biased. This means that at the start of the evaluation it must be clear for all persons involved what will be done with the results and also whether the po-



litically responsible officials will or will not be informed. Ideally these kinds of agreements is made at the outset of the whole mitigation process, as a part of the ‘declaration of principles’ (see paragraph 3.4).

10.2 Feedback to risk assessment

The goal of a mitigation plan is to reduce risks. Therefore, once the mitigation measures are implemented, a new risk assessment has to be made to research the implications of the policies. In an all hazard approach this may result in a new prioritization of different risks, meaning in future another kind of risk will get more attention. In a single hazard approach a new risk assessment may lead to new mitigation measures on other locations. In any case it is important to present the actual effect of mitigation policies by means of a changed risk assessment and if possible a new risk diagram which reflects the reduced risk. It is only logical that political decision-makers are provided the insight in the actual implications of their chosen policies.



Practical checklist for evaluation & feedback

- Agree upon evaluation procedures at the start of the process.
- Organize the right (preferably independent) expertise for the execution of the evaluation.
- Incorporate the implementation results in a new risk assessment.

11

MiSRaR recommendations

“The MiSRaR lessons have been very useful for the participating organizations. In future we expect to keep benefiting from all the practical experiences we have shared.”

Peter Bos, general director //
Safety Region South-Holland South, The Netherlands



11.1 The RISCE approach for local governments

During the project the MiSRaR partners have shared and collected a great amount of practical experiences. The main practical lessons have been described in this handbook. The most important ones can be summarized in what the MiSRaR project has come to call the RISCE approach (pronounce: ‘risky’). This approach states that for a successful mitigation strategy at least the following five basic principles have to be taken into account:

Risk assessment: insight in risks is the starting point for successful mitigation.

Integral: only when all effects and all vulnerabilities are taken into account a meaningful mitigation strategy can be designed. A successful strategy includes measures in all layers of multi layer safety.

Structural: mitigation is a continuous process, which has to be embedded in the relevant organizations.

Cooperation: all relevant government agencies, civil society, industries and inhabitants need to cooperate.

Early: risks can be most effectively mitigated if safety is considered in spatial development as early as possible.



11.2 Top 10 lessons of each partner

During the MiSRaR project the learning process was different for every partner. Each partner learnt specific lessons. To help other local governments that want to bring the MiSRaR lessons into practice to set priorities for themselves, every MiSRaR partner has made a top 10 of lessons (in random order) which proved most valuable for them. These lists provide different perspectives to the MiSRaR conclusions and can be considered as an invitation to other governments to make their own top 10 and thus improve their approach to mitigation.



Mirandela

1. Establish shared definitions with your partners, so you can cooperate on the basis of a common ground.
2. Improve international knowledge exchange, so local governments can help each other to improve.
3. Have an open mind to 'on the job learning': learn from both good practices and bad practices.
4. Make a conscious assessment of stakeholders, rather than taking the existing network for granted.
5. CBA is vital and requires specific expertise.
6. Public-private partnership is of great importance. Many public and private bodies are involved and they often want to achieve conflicting objectives if no partnership is established.
7. Establish clear goals at the start of the process and directly after the risk assessment. Without political objectives it is impossible to develop the right mitigation policies.
8. Invest in monitoring capabilities, because implementation doesn't happen automatically.
9. Make evaluation a continuous process, so you can learn directly from your practical experiences.
10. Use independent evaluators to be sure that you get the most out of the evaluation.



Aveiro

1. CBA is a central instrument for mitigation planning, because it provides the necessary insight in the effectiveness of measures.
2. Advocate for a new political paradigm in which risk mitigation gets high priority.
3. Be RISCE!
4. Monitor the implementation and enforce regulations, mainly those on spatial development, land use and safe building.
5. Look outside your own borders: take risks from other areas in consideration in your risk assessment.
6. Make use of scientific research and modelling for your risk analysis.
7. Try to imagine the unthinkable: also identify potentially catastrophic risks outside of the normal paradigm like tsunamis and meteorites.



8. Always develop accurate risk maps, which serve many purposes in risk management and crisis management.
9. Build your network and try to incorporate mitigation in all kinds of developments.
10. Raise public awareness and make mitigation a leading societal interest.



Epirus

1. Integrate GIS systems to make your risk map accurate.
2. Use a risk diagram to set priorities between different kinds of risks.
3. On the long-term, try to integrate the importance of risk assessment and mitigation in the paradigms of the emergency services, because a good prioritization of risks and more attention for prevention lead to more effective and efficient use of public means.
4. Invest in public awareness and disaster education to improve prevention, preparedness and self resilience.
5. Make cooperation paramount. Build personal relationships and try to know more about the 'inner operation' of your partners: how do they work, what is their interest?
6. Form structural alliances to lobby and to make contact with the key decision-makers.
7. Use a 'pressure tactic' to enforce safety policies. Administrative penalties might be faster than formal criminal prosecution.
8. Financial solidarity: ask beneficiaries to contribute to mitigation policies.
9. Make a 'quick and dirty' CBA to gain insight in the balance of costs and also take into consideration qualitative parameters.
10. Ensure continuous monitoring of implementation.



Forlì-Cesena

1. Distinguish between public and professional risk maps to ensure confidentiality of classified information.
2. Ensure the continuous updating of risk data and mapping.
3. Search for shared interests and objectives between risk mitigation and nature conservation.
4. Design a systematic approach to lobby and advocacy to be ready to use a 'window of opportunity'.
5. An all hazard approach to the risk assessment helps to prioritize and rationally plan your policies and allocate budgets.
6. For risk awareness it is important to organize a transparent risk assessment and make the results publicly accessible.
7. Make use of safety volunteers to advocate for mitigation.
8. Be aware that some measures might be unpopular, so take societal interests and evaluation criteria into consideration when deciding upon mitigation policies.
9. Avoid conflicting or overlapping responsibilities and mandates and therefore make a good agreement before starting to cooperate.
10. Use CBA to gain insight in different vital interests and build financing coalitions.



Euro Perspectives Foundation

1. Always start with accurate risk mapping.
2. Build a close cooperation between safety experts and political decision-makers.
3. Make CBA a central part of your capability assessment.
4. Lobby to integrate safety in national legislation for spatial development.
5. Split the costs of mitigation between different budgets. If local governments as well as the national ministries contribute to mitigation, they will feel more ownership for risks.
6. Public awareness is a success factor for sustainable results.
7. Use local regulations and codes to implement mitigation policies in land use and spatial planning.
8. Invest in monitoring.
9. Always perform an evaluation.
10. Share good practices and experiences within your area, your own country and the EU.



South-Holland South

1. Safety should be made a fundamental consideration in spatial development processes.
2. Performing a cost-benefit analysis is vital for the mitigation process.
3. It is important to be more aware of lobby and advocacy processes.
4. Ecology should be made a 'natural' partner of safety.
5. Create win-win between safety and other vital interests of society.
6. Try to incorporate safety measures in projects financed from other budgets.
7. A balance is needed between single hazard and all hazard risk assessments. For overall prioritization an all hazard approach is needed, but when a specific risk is chosen a more detailed single hazard analysis might also be needed.
8. A successful mitigation strategy includes measures on all levels of multi-layer safety.
9. Risk education should be part of every mitigation strategy.
10. Sometimes nationally set objectives and budgets are indispensable, because many risks do not keep themselves to man-made borders.

11.2 Recommendations for European wide improvement of mitigation

In closure, the MiSRaR partners have also encountered various conclusions directed to the national and international level. They have decided to share these conclusions in order to encourage an European wide improvement of mitigation.

Correlation between legislation on safety and spatial development & Natura2000

First and above all the MiSRaR partners really want to stress the importance of a more direct correlation between (national and EU) legislation for safety and spatial development. This correlation should not be directed primarily at safety regulations



for specific industries (which is already regulated in detail), but should be about the fundamental early involvement of safety concerns in spatial processes. Also a close correlation with legislation on nature conservation should be made, like a legal obligation to include a safety paragraph in Natura2000 management plans.

Severe international risks

As discussed before, many risks transcend the man-made borders of governments, both local and national. MiSRaR wants to demand specific attention for severe international risks that have border-crossing effects and require international expertise. Examples are tsunamis, super storms, major volcanic eruptions, nuclear incidents, meteorites, solar storms, pandemic outbreaks of diseases and also increased safety risks due to global warming. Local governments lack the expertise and funds to confront these kinds of risks, although in the end they all can affect local communities directly. These kinds of risks can only be confronted by joint international action, coordinated on a supra national scale.

Public awareness of European citizens

Public awareness is in many ways essential for risk mitigation, disaster preparedness, response and recovery. Awareness increases the support for prevention policies. Also it improves self reliance. The MiSRaR partners plead for involvement of local communities in local mitigation processes. However, the general risk communication and education is also a national and international responsibility. Through mandatory risk education on schools and EU wide communication campaigns a lot could be accomplished.

International databases

The MiSRaR partners have concluded that there is a lot of information available, but a lack of actual information exchange. For local governments it is almost impossible to do international research into available data on risk assessments, mitigation measures and CBA's. A international or at least European data base for those kinds of information might greatly improve the quality and reliability of local assessments.

Scientific research

Besides information exchange there is also need for more scientific research. Local initiatives to cooperate with universities have proved the value of scientific research for mitigation policies. The main scientific issues for mitigation are comparable for all countries. Therefore an intensification of EU research programmes would be very helpful.

Common definitions

International cooperation would greatly benefit from clear common definitions of relevant concepts. The EU '*Staff Working Paper on Risk Assessment and Mapping Guidelines for Disaster Management*' is a first step, but the definitions should ideally be



laid down cross-sectoral: also in correlation with the 'language' and legal frameworks of spatial development.

Border crossing cooperation

Traditionally the EU invests in border crossing cooperation projects, also in the field of disaster preparedness and in a lesser extend risk mitigation. Especially for safety risks this kind of cooperation between directly adjacent territories is very important. However, the awarding of cooperation projects is mainly considered from the perspective of economic development and not from the risk setting. It is important to identify risky areas within Europe where the current international cooperation is not yet sufficient.

Structural knowledge sharing

Last but not least: international knowledge sharing proved to be very successful for the MiSRaR partners. The MiSRaR partners dream of a situation in which this kind of exchanges is implemented more fundamentally as part of the European concept.



Epilogue

“When we accept that the similarities of mitigation processes in European countries largely outnumber the differences, we also should accept that more should be done to improve knowledge exchange.”



Ruud Houdijk, consultant on risk and safety management //
Houdijk Consultancy, The Netherlands

For all MiSRaR partners the project has proved the value of knowledge exchange. New insights were gained, not only through learning from the experiences and good practices of each other, but also by contemplating on the own situation and local peculiarities. If anything, the seminars revealed that every EU member state has their own ‘risk culture’, reflected by differences in formal legislation, in political decision processes, in positions of public and private bodies, in budget allocation and in the end also in risk acceptance and resilience. However, the similarities were even more striking. Beneath country specific problems the common ground could always be found: general principles and lessons on mitigation which are applicable throughout the EU. In this handbook the general lessons learnt by the MiSRaR partners have been described. These are practical lessons from practical experience. Understanding these lessons and taking courage from solutions for similar issues in other countries provides a solid basis for improvement of mitigation.

This handbook is aimed to be an invitation for practical implementation. By incorporation as much practical lessons, checklists and good practices as possible, the MiSRaR partners hope to encourage local, regional and provincial governments throughout the EU to consider improving risk mitigation in spatial planning. Also the national governments are invited to reflect on the need for more correlation in the legislation and budget allocation for mitigation and disaster relief on one side and spatial development on the other. In the end, the objectives shared by the MiSRaR partners themselves are to implement the lessons learnt in their own organization and local mitigation network and at the same time to maintain their international network for knowledge exchange. This way the MiSRaR partners want to set an example of structural learning and solidarity within the EU.

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 <http://ec.europa.eu/environment/seveso/>

⁷ ISO 31010.

⁸ United Nations International Strategy for Disaster Risk Reduction (2009) *UNISDR Terminology on Disaster Risk Reduction*. (Geneva, UN ISDR).

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 See 9.

¹¹ *Method for National Risk Assessment*, Ministry of Safety and Justice, The Netherlands, 2008.

¹² *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.

¹³ *Working with scenarios, risk assessment and capabilities in the National Safety and Security Strategy of the Netherlands*, Dutch Ministry of Safety and Justice, October 2009.

¹⁴ NEN-EN-IEC 61025:2007.

¹⁵ *Guide to CBA of major projects; in the context of EC regional policy*, European Union.

¹⁶ Quah, Euston, Toh, Raymond, *Cost benefit analysis cases and materials*.

¹⁷ *Guideline for CBA on infrastructure, Netherlands, Ministries of Economy and Transport*.



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