

# CRN REPORT

## Focal Report 5

Using Scenarios to Assess Risks:  
Examining Trends in the Public Sector

Zurich, July 2011

Crisis and Risk Network (CRN)  
Center for Security Studies (CSS), ETH Zürich

Commissioned by the Federal Office for Civil Protection (FOCP)

*Purpose:* As part of a larger mandate, the Swiss Federal Office for Civil Protection (FOCP) has tasked the Center for Security Studies (CSS) at ETH Zurich with compiling focal reports on critical infrastructure protection and on risk analysis to promote discussion and provide information about new trends and insights.

© 2011 Center for Security Studies (CSS), ETH Zurich.

Authors: Myriam Dunn Cavelty, Elgin Brunner, Jennifer Giroux, Christoph Doktor, Gabriel Brönnimann

Contact:

Center for Security Studies (CSS)

ETH Zurich

Haldeneggsteig 4, IFW

8092 Zurich

Switzerland

Tel.: +41-44-632 40 25

[crn@sipo.gess.ethz.ch](mailto:crn@sipo.gess.ethz.ch)

[www.css.ethz.ch](http://www.css.ethz.ch)

Contracting entity: Federal Office for Civil Protection (FOCP)

Project lead FOCP: Stefan Brem, Head Risk Analysis and Research Coordination

Contractor: Center for Security Studies (CSS), ETH Zurich

Project supervision ETH-CSS: Myriam Dunn Cavelty, Head New Risks Research Unit,  
Andreas Wenger, Director CSS

*Disclaimer:* The views expressed in this focal report do not necessarily represent the official position of the Swiss Federal Office for Civil Protection, the Swiss Federal Department of Defence, Civil Protection, and Sport or any other governmental body. They represent the views and interpretations of the authors, unless otherwise stated.

## CONTENTS

INTRODUCTION.....	2
1 SCENARIOS AND THEIR RELATIONSHIP WITH RISKS (THEORY) .....	4
1.1 Type 1: Scenarios in Foresight.....	5
1.2 Type 2: Scenarios in Risk Assessment .....	5
1.3 Differences.....	6
2 SCENARIOS IN RISK MANAGEMENT (PRACTICE) .....	7
2.1 Denmark .....	8
2.2 The Netherlands.....	11
2.3 Germany .....	14
2.4 United Kingdom.....	16
3 CONCLUSION AND RECOMMENDATIONS FOR SWITZERLAND .....	19
3.1 Systematic Model for the Use of Scenarios in Risk Assessment.....	20
3.2 Final Remarks .....	21
4 LIST OF REFERENCES.....	24

## THE TASK

The analysis and evaluation of risks and threats relevant to the civil protection system is among the key responsibilities of the Swiss Federal Office for Civil Protection (FOCP). As part of a larger mandate, the FOCP has tasked the Center for Security Studies (CSS) at ETH Zurich with producing ‘focal reports’ (Fokusberichte) on risk and vulnerability analysis.

According to this mandate, the focal reports are compiled using the following method: First, a ‘scan’ of the environment is performed with the aim of searching actively for information that helps to expand and deepen the knowledge and understanding of the issue under scrutiny. This is a continuous process that uses a variety of sources. Second, the material thus collected is filtered, analyzed, and summarized in the focal reports. Previous focal reports can be downloaded from the website of the Center for Security Studies CSS at [http://www.css.ethz.ch/publications/risk\\_resilience\\_reports\\_EN](http://www.css.ethz.ch/publications/risk_resilience_reports_EN).

## INTRODUCTION

Since the end of the Cold War, security issues are increasingly framed as a diverse set of uncertain challenges that are embedded into a complex environment. This change has led to a re-actualization of the practices of emergency management, civil protection and infrastructure protection in a broader and more politically salient national security context. Consequently, the term “risk” has become a pervasive concept in national (and to a more limited degree, international) security policy<sup>1</sup> as it acknowledges a high degree of uncertainty with regard to the shape and the eventuation of future events. At the same time, it is a concept that makes the rationalization of fears and dangers possible through the quantification of future events, thereby effectively reducing uncertainty.<sup>2</sup>

To calculate risks, the public sector has mainly drawn from the economic or technical realm to adopt the risk “formula” likelihood/probability of occurrence times expected damage (likelihood x damage = level of risk). On the one hand, this quantitative understanding of risk comes with a variety of strengths, such as comparability of different risks in terms of cost-benefit analyses. On the other hand, it also has weaknesses:<sup>3</sup> risk analysis requires a large amount of data to fully assess and quantify risks though such data is often not easily available in statistical form

(even for issues such as natural hazards).<sup>4</sup> In absence of enough empirical information, the established practice is to move to additional (and different) data gathering: ‘Hard’ data is coupled with supplementary information garnered from expert judgments (Delphi Method). In addition, all the available information about a specific risk is usually compiled into scenarios. In the most basic sense, **scenarios** are stories of possible (adverse) events and how they unfold/develop.

However, despite the well-established use of scenarios in security planning, various aspects of this use remain under-researched. In order to fill parts of this gap, we distinguish between **two different types of scenarios**: one type is used for foresight activities and one is used in risk assessment. While there is a considerable amount of literature on foresight methodology in general and some for foresight in public policy in particular, little to no systematic literature on scenarios in risk assessment done in the public policy sector exists. This report aims to shed some light on the interrelationship between (different types of) scenarios and risk assessment by looking more closely at risk management approaches in Denmark, the Netherlands, Germany and the United Kingdom (UK). In turn, we hope to develop a more nuanced understanding of the value and limits of scenarios in risk assessment.

Going forward, the report begins by describing the two different roles that scenarios play in both analyzing and managing risks. From there, we move from the theoretical to practical side by examining the application of scenarios in the aforementioned countries. Given the lack of literature on the role and use of scenarios in risk assessment, one of our primary contributions is to evaluate this relationship in county-specific case studies. We conclude with some final remarks that position the analysis within the situation in Switzerland.

1 Peterson, Karen Lund (2011) ‘Risk Analysis – a Field within Security Studies?’ *European Journal of International Relations*. Prepublished August 23 as doi:10.1177/1354066111409770.

2 For a famous differentiation between risk and uncertainty, see: Frank Knight (1921) *Risk, Uncertainty and Profit*, Chicago: University of Chicago Press.

3 Renn, Ortwin (1998) ‘Three Decades of Risk Research: Accomplishments and New Challenges’, *Journal of Risk Research* 1(1): pp. 49–71. Additional problems stem from difficulties with factoring in human/social aspects of risk perception and acceptance. For inclusion of the consideration for risk aversion factors, see: <http://bit.ly/wxhthc>. In addition, discussions about protection goals (see: [http://www.planat.ch/fileadmin/PLANAT/planat\\_pdf/alle/R1261d.pdf](http://www.planat.ch/fileadmin/PLANAT/planat_pdf/alle/R1261d.pdf)) can overcome some of these difficulties.

4 See Bründel, M. (2009) ‘The risk concept and its application in natural hazard risk management in Switzerland’, *Natural Hazards and Earth Systems Sciences* 9(3): pp. 801–13.

# 1 SCENARIOS AND THEIR RELATIONSHIP WITH RISKS (THEORY)

Risks are future oriented and become real when they manifest. In other words, risks are what *might* happen rather than what is happening.<sup>5</sup> Thus, it is not surprising that within the risk management field the use of scenarios (as a tool) and scenario planning (as a methodological approach) has become a common way to assess and deal with risk, in all of its myriad forms. Most basically, scenarios are used to talk about possible future events (risks) in the present and to help prepare for them.

Scenario planning is rooted in the 1940s when during the Manhattan Project scientists used scenario exercises to assess the potential effects of the atomic bomb. This method was then carried over into the early days of the Cold War when US think tanks such as the RAND Institute in partnership with US government military agencies developed scenarios to imagine the various inter-state confrontations that could occur during this tenuous time. However, while scenario planning in the early days was positioned within military strategic echelons, in the last 50 years it has been mainly employed, written about and further advanced by the private sector, specifically in strategic management research and practice. This shift was primarily influenced by Royal Dutch/Shell who, during the 1970s, became well known for using scenario planning as part of its strategy management process.<sup>6</sup> Adopting this methodological approach allowed the company to look ahead and create various, rational stories about possible futures.<sup>7</sup> More

recently, governments have started to increasingly utilize scenario planning in their own strategic foresight and risk management activities. For instance, in the military domain, both the British Ministry of Defense as well as the Swedish Ministry of Defense, to name only two examples, rely heavily on scenario techniques for planning, training and supporting long-term force and capability development.<sup>8</sup> In addition, comprehensive risk assessment efforts on the national level, underway in a variety of countries, use scenarios to present the potential gravity and shape of different types of risks in the tradition of risk assessment done in emergency planning and disaster management.<sup>9</sup>

In these processes, the term ‘scenario’ is used for a variety of fundamentally different things. Below, we will discuss the use of scenarios in two different yet interrelated public policy-related areas: first, scenarios in foresight and second, scenarios in risk assessment.

5 Wenger, Andreas, Victor Mauer und Myriam Dunn Cavely (2008) ‘Preface’, in: B. Habegger, *International Handbook on Risk Analysis and Management: Professional Experiences*, Zürich: Center for Security Studies, p. 5.

6 For more information on Shell’s experience with scenarios see: van der Heijden, K. (1996) *Scenarios: The Art of Strategic Conversation*, John Wiley: Chichester.

7 To this day, Shell continues to rely on this method and has a proven track record of anticipating critical events that have

impacted its core industry, the energy sector. By expanding its time horizon for strategic planning, Shell was able to forecast oil price shocks and fluctuations and other major effects due to changes in the global political system. See: [http://www.shell.com/home/content/aboutshell/our\\_strategy/shell\\_global\\_scenarios](http://www.shell.com/home/content/aboutshell/our_strategy/shell_global_scenarios).

8 Foresight Horizon Scanning Centre (2009) *Scenario Planning*, London, p. 5 and Ritchey, Tom (2009) ‘Developing Scenario Laboratories with Computer-Aided Morphological Analysis’, presented at the 14th International Command and Control Research and Technology Symposium. Washington DC, 15.–17.6.2009, p. 2, see: <http://www.swemorph.com/pdf/cornwallis3.pdf>.

9 For a more systematic evaluation of different “horizon scanning” efforts, see: Habegger, Beat (2009) *Horizon Scanning in Government: Concept, Country Experiences, and Models for Switzerland*, Zurich: Center for Security Studies.

## 1.1 Type 1: Scenarios in Foresight

In the area of foresight (where most literature on scenarios can be found)<sup>10</sup> scenario planning is regarded as a technique to aid strategic analysis and decision-making processes. In this context, scenarios are “internally consistent” stories or views about the future.<sup>11</sup> These different stories or views are then used as a backdrop for experts and policy makers to develop strategies and policies (the “planning” part in scenario planning). The goal is to come up with a set of policy options that are “robust, resilient, flexible and innovative.”<sup>12</sup> Scenario planning is not a tool that claims to be able to predict future events. Rather, it is a process that enables engaging with different futures (e.g. plausible, possible, probable or preferable futures) and considering the implications for decision making at the present moment. Scenario planning in policy development settings therefore enhances the understanding of current and possible future policies that can in turn help detect and avoid problems before they occur.<sup>13</sup> The content of the future scenarios is certainly not unimportant, but it is not understood as a basis for planning for contingencies but as a basis for additional deliberations (like strategy finding or strategy testing).

Within foresight activities, the concept of risk does not explicitly figure into the scenario-building pro-

cess. Yet, within the security context there is often an automatic focus on risks, which are defined as adverse events situated in the future. From this perspective, a typical question in a scenario planning exercise would be: “What risks do we face in country Y over the next five years?” To answer such a question scenarios would first be constructed to depict different futures over the next five years and then be used in a workshop setting where participants would identify the different risks in these futures. From there, different strategies could be developed to meet the challenges posed in each scenario. For example this could result in developing a strategy for optimal risk avoidance or it could simply be used to do a systematic capabilities check.

## 1.2 Type 2: Scenarios in Risk Assessment

On the other hand, scenarios are also used as a tool in risk analysis and assessment, whereby a risk is understood as likelihood/probability of occurrence times expected damage (likelihood x damage = level of risk). In this area, scenarios are understood as a description of a risk that is “actualized” and unfolding, mostly in the form of a short prose text that can be enriched with tables, facts, and figures. Most importantly, they are used to determine or discuss the (possible) impact/consequence of a hazard, usually by looking at different possible event pathways. Often, different intensities are considered to understand the potential range of the challenge.

Thus, the second type of scenarios not only serves to inform and sensitize both the stakeholders and authorities about possible security challenges, but also to develop mitigating strategies. In other words, scenarios in risk analysis and assessment are used to flush out the implications of a hazardous event with key stakeholders and develop contingency plans, prepare the response to the event and so to mitigate the negative consequences. In fact, it is quasi impossible

10 See for example: Schwartz, Peter (1991) *The Art of the Long View*, New York: Doubleday or Miller, Kent D. & H. Gregory Waller (2003) ‘Scenarios, Real Options and Integrated Risk Management’, *Long Range Planning* 36(1): pp. 93–107.

11 Ringland, Gill (2002) *Scenarios in Public Policy*, Chichester: John Wiley & Sons, p. 3.

12 Foresight Horizon Scanning Centre (2009) *Scenario Planning*, p. 5.

13 Over the years, some general methodologies have emerged for a successful scenario planning process. Six typical points of scenario planning according to Wulf, Torsten, Meissner, Philip and Stubner, Stephan (2010) *A Scenario-based Approach to Strategic Planning – Integrating Planning and Process Perspective of Strategy*, Leipzig Graduate School of Management, p. 10–11.

to talk about risks without using some type of scenario to do so.

### 1.3 Differences

The most substantial differences between type 1 and type 2 regard to type of “knowledge” that is valued and their aim. First type scenarios are used mainly to develop robust strategies for the future, whereas the second is used for emergency (or contingency) planning. In the first type of scenarios, participants are asked to be creative and imaginative in the foresight process, whereas in the second type, scenarios are understood as “adverse event illustrations” and are thus based on “secured” knowledge and experiences made in the past. While the aim of scenario-building as foresight tool is to push the limits of what we usually imagine as far out as possible, the second type of scenario aims to depict the events occurring when a risk manifests as realistically as possible. Table 1 shows the distinctions between the use of scenarios in foresight and risk assessment.

**Table 1: Comparison between two Understandings of Scenarios (Ideal-type)**

	<b>Type 1: Scenarios in Foresight</b>	<b>Type 2: Scenarios in Risk Assessment</b>
Purpose	Story of possible futures	Illustration of a possible event and how it unfolds
Used for (mainly)	Development of Strategies	(Contingency) Planning
Timeframe	Medium to long-term	Short to medium-term
Type of Knowledge	Out-of-the box thinking, innovative, creative	Experience based knowledge
Content is	Internally consistent, possible not probable	Precise and accurate

Turning to the more practical application of scenarios in risk assessment (Type 2), the following chapter continues this discussion by analyzing the different approaches adopted by four country case studies.



## 2 SCENARIOS IN RISK MANAGEMENT (PRACTICE)

This chapter examines the use of scenarios in risk assessment (and management) approaches in Denmark, the Netherlands, Germany and the United Kingdom (UK). We restrict this analysis to risk management approaches by government bodies and do not look at similar efforts in the private sector

or more general foresight activities, unless they are closely related to risk assessment (like in the case of Great Britain). In all four countries, scenario planning is an integral part of the risk analysis process, and as such it is used as an important tool for civil contingency planning.

**Table 2: Summary of Scenarios in Risk Assessment per Country**

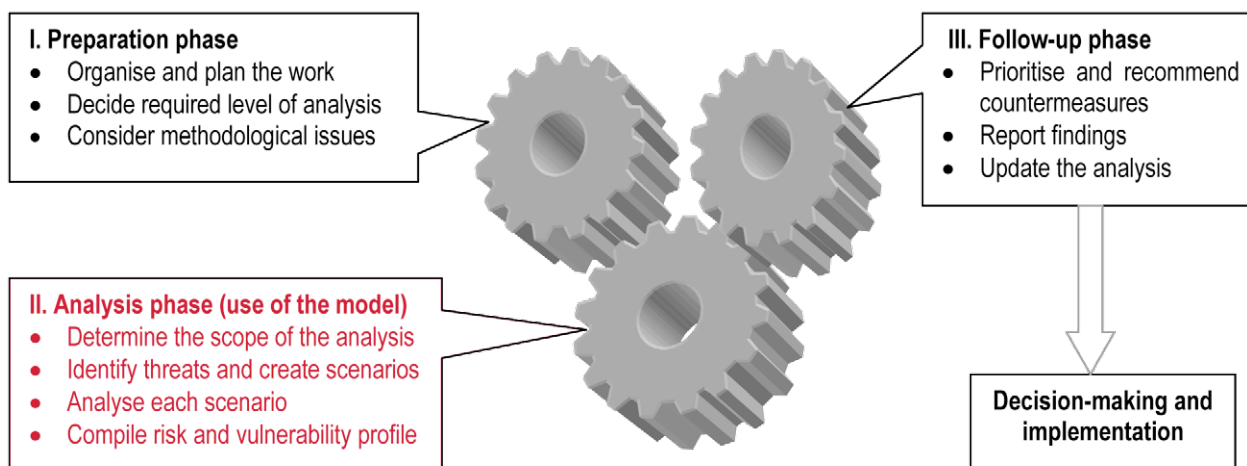
	Denmark	Netherlands	Germany	United Kingdom
# of steps in Process	• Three phases	• Three phases	• Five steps	• Six steps
Names of steps	<ul style="list-style-type: none"> <li>• Preparation phase</li> <li>• Analysis phase</li> <li>• Follow-up phase</li> </ul>	<ul style="list-style-type: none"> <li>• Analysis of threats and assessment of risks</li> <li>• Capability analysis and strategic planning</li> <li>• Monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Description</li> <li>• Risk assessment &amp; scenario</li> <li>• Probability determination</li> <li>• Assess impact</li> <li>• Compilation/ visualization</li> </ul>	<ul style="list-style-type: none"> <li>• Contextualize</li> <li>• Hazard &amp; allocation review/ assessment</li> <li>• Risk analysis</li> <li>• Risk evaluation</li> <li>• Risk treatment</li> <li>• Monitoring</li> </ul>
Scenarios developed in...	• Analysis phase	• Threats analysis & assessment of risks	• Risk assessment & develop scenario	• (not specified)
Scenarios depict...	• Extraordinary events that seriously affect critical functions of society	<ul style="list-style-type: none"> <li>• Danger (accidents/natural disasters) &amp; threats (with malicious cause)</li> <li>• Incidents that impact national security</li> </ul>	• Danger & hazards to chosen area (step 1 of process) or infrastructures in that area	• (not specified)
Scenarios specify...	<ul style="list-style-type: none"> <li>• Vulnerability</li> <li>• Probability</li> <li>• Consequences</li> </ul>	<ul style="list-style-type: none"> <li>• Probability</li> <li>• Consequences (objective &amp; subjective)</li> </ul>	<ul style="list-style-type: none"> <li>• Probability</li> <li>• Impact</li> </ul>	• (not specified)
Scenarios should be...	<ul style="list-style-type: none"> <li>• Realistic</li> <li>• Sufficiently detailed</li> </ul>	<ul style="list-style-type: none"> <li>• Clearly formulated</li> <li>• Substantiated with figures</li> <li>• Weighted</li> <li>• Possible</li> </ul>	<ul style="list-style-type: none"> <li>• Clear and detailed</li> <li>• Accurate</li> </ul>	• (not specified)
Scenarios are basis for...	<ul style="list-style-type: none"> <li>• Crisis management exercises</li> <li>• Vulnerability reports</li> <li>• Awareness building</li> <li>• Decision making and resource allocation</li> </ul>	<ul style="list-style-type: none"> <li>• Capability analysis</li> <li>• Communicating about and obtaining feeling for future uncertainties</li> </ul>	<ul style="list-style-type: none"> <li>• Decision-making in civil protection</li> <li>• Emergency planning</li> <li>• Crisis management</li> </ul>	• Risk assessment

Overall, we find that there are many similarities (as outlined in Table 2) in how scenarios are conceptualized and used to do the risk assessment.<sup>14</sup> Though this is not overly surprising, given the similar goals behind the risk assessment efforts that we analyzed, it nonetheless shows a high convergence of ideas among civil protection and similar agencies in Europe.<sup>15</sup>

## 2.1 Denmark

As a result of the Danish National Vulnerability Evaluation from 2004, the Danish Emergency Management Agency (DEMA) developed a generic risk and vulnerability methodology for civil contingency planning. In this context, DEMA’s Centre for Resilience and Contingency Planning has produced a model for risk and vulnerability analysis, (RVA model) as a basis for preparedness planning for authorities with civil preparedness responsibilities.<sup>16</sup> The RVA model is scenario-based and presupposes a process with three phases whereby scenario planning is a pivotal part of the general preparedness planning. Figure 1 outlines this process.

Figure 1: DEMA’s civil preparedness planning process<sup>17</sup>



14 This focal report focused mainly on the risk assessment process and the use of scenarios in this. However, an analysis of the actual content of these scenarios (the way that they are written, but also the visuals that are used, etc.) would be a very interesting additional issue to analyze both academically and practically.

15 It bears mentioning that the UK does not make all of its methodologies and government reports publically available in full, unlike Denmark, the Netherlands and Germany, which provide their respective methodologies online. The UK is a special case because it is the only country with a rather close integration of both types of scenarios in the political process or, rather, their combination of more future oriented scenario building with capability planning (whereby the exact combination remains unclear). See also Habeggger’s findings (op. cit. 2009).

16 DEMA’s Approach to Risk and Vulnerability Analysis for Civil Contingency Planning, [http://brs.dk/eng/inspection/contingency\\_planning/rva\\_model/Documents/Background\\_paper\\_on\\_DEMAs\\_approach\\_to\\_risk\\_and\\_vulnerability\\_analysis.pdf](http://brs.dk/eng/inspection/contingency_planning/rva_model/Documents/Background_paper_on_DEMAs_approach_to_risk_and_vulnerability_analysis.pdf)

17 DEMA’s Approach to Risk and Vulnerability Analysis for Civil Contingency Planning, p. 3.

The Introduction and user guide to DEMA’s Model for Risk and Vulnerability Analysis<sup>18</sup> not only outlines the 4-step process seen in phase II (circled in Figure 1) but it also makes the realization of risk analysis possible even for users without any previous knowledge in this area. The **first step** of the RVA model is to **determine the scope of the analysis**, which consists of identifying the object of the analysis that has a relationship to the critical functions for a given organization, region or the whole society that must be maintained in case of catastrophes or large-scale accidents.

Once the scope of the analysis has been determined, the **second step** involves **identifying threats and creating scenarios** that depict extraordinary events that can seriously affect the critical functions of society. More specifically, according to DEMA’s recommendations for developing threat scenarios, a scenario should describe a continuous incident progression, in which the seriousness of the consequences requires extraordinary preparedness actions. For this purpose, the RVA model provides a template that specifies various conditions that help to generate an adequate description of each scenario.<sup>19</sup> See Figure 2 for an example.

**Figure 2: Danish Scenario Example**

<b>Threat scenario no. 1</b>	<b>Title: Long-term power failure</b>
Threat category/Type of event	<b>Disruption/failure of critical functions:</b> Your organisation/area is hit by the consequences of a very extensive grid and power station fall out.
Summary of events	There is a power outage in your entire geographic region. As time passes, more and more emergency power generators fail because of lack of fuel. Battery-driven back-up systems and the like fail within hours.
Geographic extent	<b>Regional:</b> The power failure affects the entire region, as well as power supplies between the region and other regions/countries.
Duration	<b>2 – 7 days:</b> The power failure lasts 3 days.
Placement in time	<b>Winter Weekday within normal working hours:</b> The power failure begins on a winter day during normal working hours.
Warning	<b>No warning</b>
Persons/assets at risk	The power failure affects the entire region and immediately impacts all activities and functions that are dependent on electricity, including communication systems, IT systems, burglary alarms, public and private transport, petrol stations, businesses, heating systems (oil, natural gas, and central district heating) and many more facilities.
Background for the scenario	<b>Incident observed abroad:</b> In 2003, USA and Canada were hit by a long-term power failure that affected 50 million people. In 2003, Italy was hit by a short-term power failure that affected the entire country. In 2003, Denmark and southern Sweden were hit by a power failure that lasted 6 hours because of a technical breakdown in southern Sweden.
Direct causes leading to the realisation of the scenario	<input type="checkbox"/> Natural factors <input type="checkbox"/> Intentional human actions <input checked="" type="checkbox"/> Unintentional human actions <input checked="" type="checkbox"/> Technical malfunction <input checked="" type="checkbox"/> Organisational errors <p>The power outage is a result of a number of almost coinciding net and power station fall outs. These are caused by a series of simultaneous faults and incidents, which, taken together, eventually lead to the final failure of the grid.  Re-starting the grid is dependent on the re-starting of certain special power stations that can start up from a dead grid, or on voltage supply from abroad. Major power station blocks, windmills, etc. cannot be used before there is electricity in the grid again.</p>

<sup>18</sup> Introduction and User guide. DEMA’s Model for Risk and Vulnerability Analysis, 2006, pp. 4 and 28, [http://brs.dk/eng/inspection/contingency\\_planning/rva\\_model/Documents/RVA-model\\_user\\_%20guide.pdf](http://brs.dk/eng/inspection/contingency_planning/rva_model/Documents/RVA-model_user_%20guide.pdf).

<sup>19</sup> The RVA model consists of four templates in total. They are accessible on DEMA’s website: [http://brs.dk/eng/inspection/contingency\\_planning/rva\\_model/Pages/rva\\_model.aspx](http://brs.dk/eng/inspection/contingency_planning/rva_model/Pages/rva_model.aspx).

<p>Other important information about the scenario</p>	<p>The temperature on the 3 affected days is below -5°C and windy, which significantly increases demand for electricity and makes repair work difficult.</p> <p>Lack of heating will be among the potentially most serious consequence of the power failure. Oil and natural gas fired furnaces will not work. District heating supply will presumably not function either, because the pumps are driven by electricity. Measures are therefore needed to aid the elderly and people in poor health. Several schools and day-care centres will probably choose to close, and many people will be unwilling to attend work full-time in cold buildings.</p> <p>Depending on the extent to which emergency power supplies have been secured, the power failure will also cause significant problems for food supplies and financial transactions. This includes production and distribution facilities, shops and storage houses that require refrigeration and freezing facilities, and payment facilities such as scanners and bank card terminals.</p> <p>The power failure will similarly result in extensive transportation problems. Petrol stations and private oil and petrol depots will generally not work, since pumps require electricity. Traffic signals will not work, and there may be problems maintaining certain control room functions.</p> <p>IT and telecommunications will also be affected to varying degrees. Many mobile phones will not work after a short time, and there could be consequences for landline telephony, master IT systems, broadband, servers, Internet providers etc.</p> <p>The above list of possible consequences is far from exhaustive.</p>
---	---

The purpose is not so much to describe the events in very precise details (such as dates, time, or scale of incident in km<sup>2</sup>) but to create realistic scenarios, (e.g. serious industrial accidents, natural catastrophes, epidemics, power supply failures or malicious human actions), that are representative of the different types of threats that can have significant negative impacts. In addition, the scenario should be outlined in sufficient detail in order to make an analysis of the associated risk and vulnerabilities possible.<sup>20</sup> Frequent or everyday accidents as well as so-called “worst-case”-scenarios of unlikely catastrophes should be excluded.<sup>21</sup>

**Serious societal consequences include:**

- ◆ Many dead, injured, sick or otherwise exposed people
- ◆ Extreme pressure on, or breakdown of, parts of society’s critical functions
- ◆ Severe damage to the environment
- ◆ Massive loss of material or financial assets
- ◆ Extensive anxiety, insecurity, anger or indignation in the population and political implications

20 An example of a threat scenario is accessible on DEMA’s website: [http://brs.dk/eng/inspection/contingency\\_planning/rva\\_model/Documents/Scenario\\_example.doc](http://brs.dk/eng/inspection/contingency_planning/rva_model/Documents/Scenario_example.doc)

21 Introduction and User guide. DEMA’s Model for Risk and Vulnerability Analysis, p. 10f.

**Extraordinary preparedness actions are typically characterized by:**

- ◆ Wide-scale use of facilities, resources and capacities
- ◆ Involvement of infrastructure preparedness teams, crisis management organizations and other players not limited to normal preparedness tasks.<sup>22</sup>

In the **third step**, the **analysis of threat scenarios** focuses on assessing the vulnerabilities of the critical functions and/or nodes in addition to the risks associated with each scenario. According to the publicly available information, a template is used so to ensure that a detailed and consistent evaluation of each scenario is conducted – one that analyzes three primary criteria: vulnerability, probability and consequences.

The final and **fourth step** consists of compiling a **risk matrix and a vulnerability overview**. On the one hand, the threat scenario is placed within the risk matrix to determine and visualize its overall risk level – the identification of which is based on both its probability and impact. This provides an illustrative graphic comparison of the different threats and cate-

22 Ibid.

gorization of risks. On the other hand, the vulnerability overview includes the assessment of vulnerability levels in each threat scenario under three primary categories: preparations, capacities for response and relief and capacities for recovery.

Overall, DEMA's RVA model can be considered as an independent scenario based risk analysis tool. In the framework of this process, the scenarios are used in various ways. For instance, a scenario database containing more than 20 predefined examples (in Danish only) has been published by DEMA in order to provide a basis for risk and vulnerability analysis for individual organizations and government agencies. Apart from that, applied threat scenarios can be used for crisis management exercises and other types of competence building. DEMA also publishes annual vulnerability reports based on scenario planning and risk analysis, which are expected to promote awareness of civil preparedness issues in both the public and private sectors and furthermore to serve as a basis for decision making and resources allocation.<sup>23</sup>

## 2.2 The Netherlands

For risk analysis, the Dutch adopts an all hazard approach and uses scenario development as a principal method in its threat analysis and risk assessment. In practice, the likelihood that a scenario may occur and its impact on the national safety and security are considered. The national safety and security is at risk when the vital interests<sup>24</sup> of both the state and its society are threatened in a way that may lead to societal disruption. The national process of the National Safety and Security Strategy consists of three main phases:

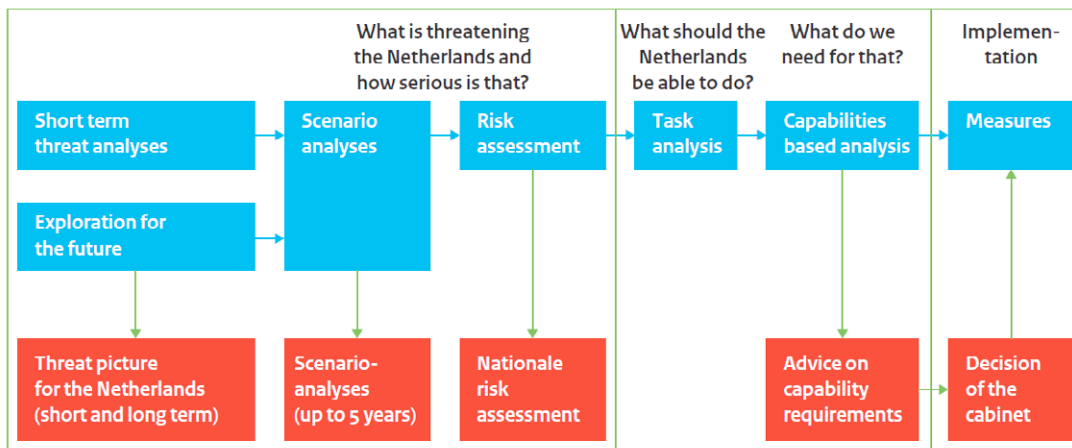
1. Threat analysis and risk assessment: identification of medium and long-term threats (including horizon scanning), scenario development, risk assessments (in terms of likelihood and impact on the vital interests).
2. Capability analysis and strategic planning: examines national capabilities to cope with the identified risk and provides recommendation to the government to improve capabilities.
3. Implementation phase: Implementation of Cabinet decision and legislation to improve the capabilities to cope with the risk.<sup>25</sup>

<sup>24</sup> Vital interests include: Territorial Safety (in terms of ensuring territorial integrity); Physical Security (public health); Economic Security (undisrupted working of economy); Ecological Security (living environment); Social and Political Stability (e.g. respect for core democratic values and the functioning of democratic institutions). See: National Security Programme. National Risk Assessment. Method Guide 2008, p.5, <http://english.minbzk.nl/subjects?ActItdt=115647>.

<sup>25</sup> Working with scenarios, risk assessment and capabilities in the National Safety and Security Strategy of the Netherlands, October 2009, pp.11–12, <http://english.minbzk.nl/subjects?ActItdt=125930>.

<sup>23</sup> See DEMA: <http://www.brs.dk/eng>.

Figure 3: The Dutch National Safety and Security Process<sup>26</sup>



The Dutch method of risk analysis and assessment combines three different Multi-Criteria Methods<sup>27</sup> that enable more transparency and balance between comprehensibility and capability to facilitate complex assessments. The approach presupposes that threats are described in the form of scenarios, which are developed by each (government) department using in-house expertise as well as external ministries, authorities or (if necessary) other actors in the corporate sector or academia.<sup>28</sup> The following outlines the requirements of scenario development within the Dutch context.

**Scenario Development requirements:**

- ◆ All the scenarios must be plausible and likely, but not with the same probability.
- ◆ Existing policy measures for prevention, preparation and reaction as well as deficiencies observed in practice have to be taken into account.

- ◆ Scenarios must have impact on a national scale on at least one of the vital interests as mentioned above (territorial safety, physical security, economic security, ecological security, and social and political stability).<sup>29</sup>

**Scenario is a description of:**

- ◆ nature and scale of one or more related incidents which have consequences for national security,
- ◆ lead-up to the incident, consisting of the underlying cause and *trigger* that causes the incident,
- ◆ context of the events – indicating the general circumstances, degree of vulnerability, and resistance of people, object and society (where relevant to the incident described),
- ◆ consequences of the incident, indicating the nature and scale,
- ◆ effects of the incident on the continuity of critical infrastructure<sup>30</sup>.

The **first phase** is devoted to **risk analysis** whereby scenarios are used to describe the possible threats and risks. The National Risk Assessment Method Guide de-

<sup>26</sup> Ibid, p. 12.

<sup>27</sup> The overall approach involves the quantitative „Weighted Sum” method, the ordinal Medal methods, and the ordinal variant of the Evamix method. For detailed information about this approach see Pruyt, E. and D. Wijnmalen (2010) ‘National Risk Assessment in The Netherlands: A Multi-Criteria Decision Analysis Approach’, *Lecture Notes in Economics and Mathematical Systems* 634(2), p. 133–143, <http://www.springerlink.com/content/16ot423960560140>.

<sup>28</sup> Working with scenarios, risk assessment and capabilities in the National Safety and Security Strategy of the Netherlands, pp. 12–13.

<sup>29</sup> Ibid, p. 22.

<sup>30</sup> National Security Programme. National Risk Assessment. Method Guide 2008, pp. 21–22, <http://english.minbzk.nl/subjects?ActItdt=115647>.

defines scenario as “a way of communicating about and obtaining a (joint) feeling for future uncertainties and factors that influence decisions that have to be taken today”. The focus here is on strategic planning with regard to political decisions and investments in risk mitigation and prevention. In a specific case, scenarios for events such as floods, pandemics and long-term unavailability of utilities as well as those that have transnational dimensions must be clearly described, substantiated with figures and weighted in order to make the risks for national security comparable.

After scenarios are developed, the **second phase assesses the risk** with regard to the likelihood that a scenario will occur and the impact it will have on the vital interests of the Dutch state and society. The impact consists of an objective component (e.g. disruption of essential supplies, material damage, and number of victims) and a subjective component (the psychological effect, such as the public outrage caused by an event). The perception factor is thus explicitly considered in the risk assessment. However, true to the qualitative nature of scenario planning, the traditional ‘risk = likelihood times consequence’ equation is minimized as it tends to suggest a strictly quantitative interpretation.<sup>31</sup> Instead, impact is measured in five categories:

- (A) limited consequences;
- (B) substantial consequences;
- (C) serious consequences;
- (D) very serious consequences; and
- (E) catastrophic consequences.

For likelihood, which applies to the next 5-year period, a difference is made between danger and threat scenarios. Danger scenarios are accidents and natural disasters, whereas threat scenarios have a malicious cause, such as a terrorist attack. In either case the Dutch utilize five categories (A-E), as illustrated

in Figure 4. Furthermore, as shown in this figure, the quantitative difference between the categories (a factor of 10) gives a degree of robustness to the estimation of likelihood.<sup>32</sup>

**Figure 4: Dutch likelihood assessment<sup>33</sup>**

Danger scenarios (non-malicious)		
Category	Quantitative (%)	Qualitative description of danger
A	< 0.05	highly unlikely
B	0.05 – 0.5	unlikely
C	0.5 – 5	possible
D	5 – 50	likely
E	50 – 100	highly likely

Threat scenarios (malicious)	
Category	Qualitative description of threat
A	no hard indications and event is considered barely imaginable
B	no hard indications, but event is considered somewhat imaginable
C	no hard indications, but event is imaginable
D	the event is considered very imaginable
E	concrete indications that the event will occur

Once this phase is completed, the assessments are brought together and presented in a two-dimensional risk diagram or risk matrix that combines different gradation in both categories of likelihood and impact. In addition, an expert working group performs a capability assessment to determine whether the country has sufficient capabilities (people, material, knowledge, skills, and procedures) at its disposal to adequately deal with identified threats and hazards. The results of the national risk assessments and the capability analysis are published in the annual report, *Risk Assessment in the Netherlands* (in Dutch only), which also includes recommendations to the government with regard to the capabilities that should be reinforced. Therefore this report can also have some influence on resource allocation and decision-making within the framework of strategic planning.<sup>34</sup>

<sup>31</sup> Working with scenarios, risk assessment and capabilities in the National Safety and Security Strategy of the Netherlands, pp. 24–26.

<sup>32</sup> Ibid.: pp. 8–9.

<sup>33</sup> National Security Programme. National Risk Assessment. Method Guide 2008, p. 9.

<sup>34</sup> Rademaker, Michael (2008) ‘National Security Strategy of the

## 2.3 Germany

For Germany, the cooperation between the *Länder* and the Federal Office of Civil Protection and Disaster Assistance (Bundesamt für Bevölkerungsschutz und Katastrophenhilfe BBK) in the framework of the so-called Joint Hazard Estimation led to the first common analysis on threats and risks in 2005.<sup>35</sup> Due to this process, in 2006, the BBK was asked to develop a method that would enable all levels of state administration to analyze the entire spectrum of risks.<sup>36</sup>

Overall, the German risk analysis approach is focused on two main factors: probability and impact. This is done from a mostly quantitative perspective that aims to compare different risks as a consequence of various threats and hazards. The analysis is based on scenarios and visualized in the classical form of a risk diagram to serve as a basis for decision-making in risk management, contingency planning and crisis management. The methodological approach for analyzing risks was developed by the BKK in cooperation with experts from the *Länder* as well as federal administration and science. In particular, the approach draws from scientific knowledge and is guided by the international standards. The following steps are part of the German risk analysis:

1. Description of a chosen area
2. Assessment of risks and development of scenarios
3. Determination of probability that a risk occurs
4. Determination of impact

5. Compilation and visualization of the respective risk scenarios in form of a risk matrix.<sup>37</sup>

According to BBK's manual *Methode für die Risikoanalyse im Bevölkerungsschutz*, risk analysis has to focus on a clearly defined geographical and/or administrative area, e.g., the federal state, one of the constituent states, administrative district or region. In terms of the **risk analysis process**, the **first step includes providing a detailed description of chosen area of analysis**; including information about geography, climate, population, natural environment, economy and critical infrastructures. In the **second step, scenarios are developed** that address the dangers/hazards related to the specific context being analyzed.<sup>38</sup> In the scenario development phase, existing statistical and scientific data should be taken into account as well as quantitative estimation with regard to measurable incidents like floods, earthquakes and technological infrastructure failure. In cases when qualitative description is necessary the BBK recommends to refer to a real incident, in order to make an analysis more demonstrative and comprehensible. More specifically, each scenario must clearly describe an incident in order to make an accurate and consistent determination of its probability and potential impact. Thus, due regard must be given to factors like the kind of threat or hazard, the time and place, the geographical extension of the incident, the intensity and duration as well as which type of infrastructures and how many people are directly concerned. Figure 5 shows some of the parameters and central questions for the description of the scenario.

Netherlands: An Innovative Approach', *Information & Security. An International Journal* 23(1): pp. 59–60.

35 See: [http://www.bbk.bund.de/SharedDocs/Downloads/BBK/EN/booklets\\_leaflets/Method\\_of\\_%20Risk\\_Analysis.pdf?\\_\\_blob=publicationFile](http://www.bbk.bund.de/SharedDocs/Downloads/BBK/EN/booklets_leaflets/Method_of_%20Risk_Analysis.pdf?__blob=publicationFile).

36 See for more details on German Joint Hazard Estimation Process: Gullotta, Gulio (2008) 'Political Risk in Civil Protection – A Practitioner's View', in: Beat Habegger (ed.): *International Handbook on Risk Analysis and Management. Professional Experiences*, Zurich: Center for Security Studies, pp. 39–42.

37 Bundesamt für Bevölkerungsschutz und Katastrophenhilfe (2010), *Methode für die Risikoanalyse im Bevölkerungsschutz*, Bonn, p. 23–41, [http://www.bbk.bund.de/SharedDocs/Downloads/BBK/DE/Publikationen/Wissenschaftsforum/Bd8\\_Methode-Risikoanalyse-BS.pdf?\\_\\_blob=publicationFile](http://www.bbk.bund.de/SharedDocs/Downloads/BBK/DE/Publikationen/Wissenschaftsforum/Bd8_Methode-Risikoanalyse-BS.pdf?__blob=publicationFile). English translation: [http://www.bbk.bund.de/SharedDocs/Downloads/BBK/EN/booklets\\_leaflets/Method\\_of\\_%20Risk\\_Analysis.pdf?\\_\\_blob=publicationFile](http://www.bbk.bund.de/SharedDocs/Downloads/BBK/EN/booklets_leaflets/Method_of_%20Risk_Analysis.pdf?__blob=publicationFile)

38 Figure 4 shows the criteria and central question in Germany's scenario development process. Ibid., p. 26.



**Figure 5: Criteria and central question in German Scenario development**

Parameter	Central Questions
Hazard	• Which type of hazardous event is considered?
Scene of occurrence	• Where does the event take place?
Spatial dimension	• Which area is affected by the event?
Intensity	• How strong is the event?
Time	• When does the event take place? (time of year/time of day, if applicable)
Duration	• How long does the event and its direct impact last?
Development	• How does the event evolve?
Notice time for warning	• Is the event expected? • Is the population able to prepare for the event? • Are public authorities able to prepare for the event?
Who is affected?	• Which subjects of protection are affected by the event? (persons, environment, objects etc.)
Reference incidents	• Have there been comparable events in the past?
Further information	• How well prepared are the responsible authorities/relief units/helpers? • Findings concerning the damage susceptibility and/or robustness of the affected persons/elements. • What else is important for the scenario, but has not yet been gathered?

Following this, **additional steps are to assess the probability and impact of the risk scenarios**. The classification of probability corresponds to the graphic representation in the traditional risk matrix and includes five dimensions between highly unlikely and highly likely. The determination of impact and consequences follows so-called *damage parameter* (“Schadensparameter”) that can, depending on threat or hazard, describe human casualties, ecological damages, interruptions of supply chains and economic losses. The **final results are visualized in the traditional risk matrix** combining the two parameters likelihood and impact.<sup>39</sup>

Similarly to Denmark and the Netherlands, Germany plans to use the results of its risk analysis as a basis for decision-making in civil protection, risk management, emergency planning and crisis management. The data evaluated helps with the prioritization of risk mitigation measures and, more broadly, crisis preparation. Moreover, the findings are transferred into exercise scenarios for crisis management exercises.

<sup>39</sup> Ibid., p. 39–41.

## 2.4 United Kingdom

A cursory review of several key documents concerning risk analysis by UK government entities shows that scenario planning plays a role in the national and regional risk assessment processes. On the one hand, scenario planning influences risk assessment and management process when performed by specialized scenario planning agencies. Various studies by the Foresight Horizon Scanning Centre, for example, have directly influenced official policies. On the other hand, many governmental departments themselves have implemented scenario planning processes. However, the government's entities own in-depth-studies (and methodologies) are not publicly accessible. In contrast to the other case studies above, the UK shows some integration of both types of scenarios in their planning processes.

In the first example, the (2004) Civil Contingencies Act<sup>40</sup> made risk assessment compulsory for all of the UK's Category 1 responders (i.e. police, fire services, emergency medical services etc.) and government levels (regionally and, since 2005, nationally with the "National Risk Assessment").<sup>41</sup> While the actual National Risk Assessment is classified, the key identified risks are made public in the National Risk Register.<sup>42</sup>

### Risk Assessment consists of 6-steps:

1. Contextualization
2. Hazard review and allocation for assessment
3. Risk analysis
4. Risk evaluation
5. Risk treatment
6. Monitoring and reviewing<sup>43</sup>

<sup>40</sup> Civil Contingencies Act 2004, <http://www.legislation.gov.uk/ukpga/2004/36/data.pdf>

<sup>41</sup> National Risk Register of Civil Emergencies, Cabinet Office, 2010, <http://www.cabinetoffice.gov.uk/sites/default/files/re-sources/nationalriskregister-2010.pdf>

<sup>42</sup> Ibid., p. 2 and p. 53ff.

<sup>43</sup> Ibid., p. 72–46 and p. 183–185. It should be noted here that

The risk assessment process involves six steps. In **step one, key stakeholders are identified** – typically including experts, but may also include “groups in the community with a particular interest” – and brought together to “describe the characteristics of the local area” (social, environment, infrastructure, hazardous sites). **Possible hazards are established in step two** while in **step three the likelihood and probability** of occurrence within the next five years is determined. Within both of these steps, the expert group describes the possible hazards and associated outcomes in detail as this process lays the groundwork for **step four**. In this step, likelihood and impact are scored for each hazard. In **step 5**, risk reduction measures are prioritized with the view of developing and adopting coherent strategies and synchronizing contingency plans. Finally, **step six**, refers to the **monitoring stage** where all of the risks are (supposed to be) reviewed.

Overall, in many aspects, the UK's risk assessment process corresponds to the use of scenarios in risk assessment and analysis discussed in the previously discussed country case studies. More precisely, similar to the other cases, a specific time frame is set (five years), stakeholders are identified who identify and quantify possible risk scenarios. The UK's risk assessment process is thus exactly what the Foresight Institute calls “risk-related scenario”, where the main questions asked could be: “What risks do we face in country Y over the next 5 years? What contingency plans should we put in place?”<sup>44</sup>

In other examples, but ones that lean more towards the foresight & horizon scanning discussion, the treasury's “Orange Book” – a guide on risk management for government departments – began providing guidance for horizon scanning to enhance the

Category 1 responders are not required by the act to perform the step “Risk Treatment”, they are only “encouraged to adopt the recommended practice”. See p. 41–42 and p. 45

<sup>44</sup> Scenario Planning, p. 7

risk management process and incorporate regular reviewing and monitoring. In particular the book notes how it “continuously searches for potential future disruptive challenges”, since “[p]olicy makers could well be interested in developments over the next twenty-five years”.<sup>45</sup> This proves that the term horizon scanning, in official UK documents, “is also used as a synonym for a variety of so-called *foresight activities* that aim to develop the capabilities of organizations to deal better with an uncertain and complex future.”<sup>46</sup> Similar to this effort, scenario planning was addressed in the government’s updated guide “Risk – Good Practice in Government”.<sup>47</sup> Here, the growing impact of the Foresight Horizon Scanning Centre on the government’s risk policies is stressed. While the guide states that by now, “many other departments had started to do ‘futures work’” themselves, Foresight regularly manages to “bring together cutting-edge science with the brightest minds of Academia and Whitehall”, thereby “produc[ing] a number of scenarios for policy makers to act upon.”<sup>48</sup> Examples mentioned in the 2006 guide to risk include the “Flood and Coastal Defence” (2004) project which continues to influence policy on this issue.<sup>49</sup> The guide’s conclusion on scenario planning methodology for risk assessment is that “[f]oresight is helping to make preparing for the future a less risky business”, and making use of Foresight’s techniques and insights is highly recommended: “set up a future’s exercise within your department or agency to find out what the main issues are”.<sup>50</sup>

Finally, scenario planning, more broadly, has become a key priority in the UK’s official National Security Strategy<sup>51</sup> (2008). Most relevant to this report, the strategy highlights the methodology used to identify and rank the major risks to the UK (as discussed in the 2010 National Security Risk Assessment<sup>52</sup>), which involves bringing together subject-matter experts, analysts and intelligence specialists to discuss and identify existing and potential risks that the UK might experience in next five to 20 years.<sup>53</sup> Overall, the strategy report stresses the need “to strengthen the Government’s capacity for horizon scanning, forward-planning and early warning to identify, measure, and monitor risks and threats.”<sup>54</sup>

45 The Orange Book: Management of Risk – Principles and Concepts. HM Treasury, 2004

46 Habegger, Beat. Horizon Scanning in Government: Concept, Country Experiences, and Models for Switzerland. Center for Security Studies, 2009

47 Risk: Good Practice in Government (Vol. 2). HM Government, 2006

48 Ibid, p. 65

49 Ibid, p. 66

50 Ibid.

51 The National Security Strategy of the United Kingdom: Security in an interdependent world. Cabinet Office, 2008. [http://interactive.cabinetoffice.gov.uk/documents/security/national\\_security\\_strategy.pdf](http://interactive.cabinetoffice.gov.uk/documents/security/national_security_strategy.pdf)

52 Fact Sheet 2: National Security Risk Assessment. 2010, <http://download.cabinetoffice.gov.uk/nss/nss-factsheet2.pdf>

53 A Strong Britain in an Age of Uncertainty: The National Security Strategy, 2010, [http://www.direct.gov.uk/prod\\_consum\\_dg/groups/dg\\_digitalassets/@dg/@en/documents/digitalasset/dg\\_191639.pdf](http://www.direct.gov.uk/prod_consum_dg/groups/dg_digitalassets/@dg/@en/documents/digitalasset/dg_191639.pdf)

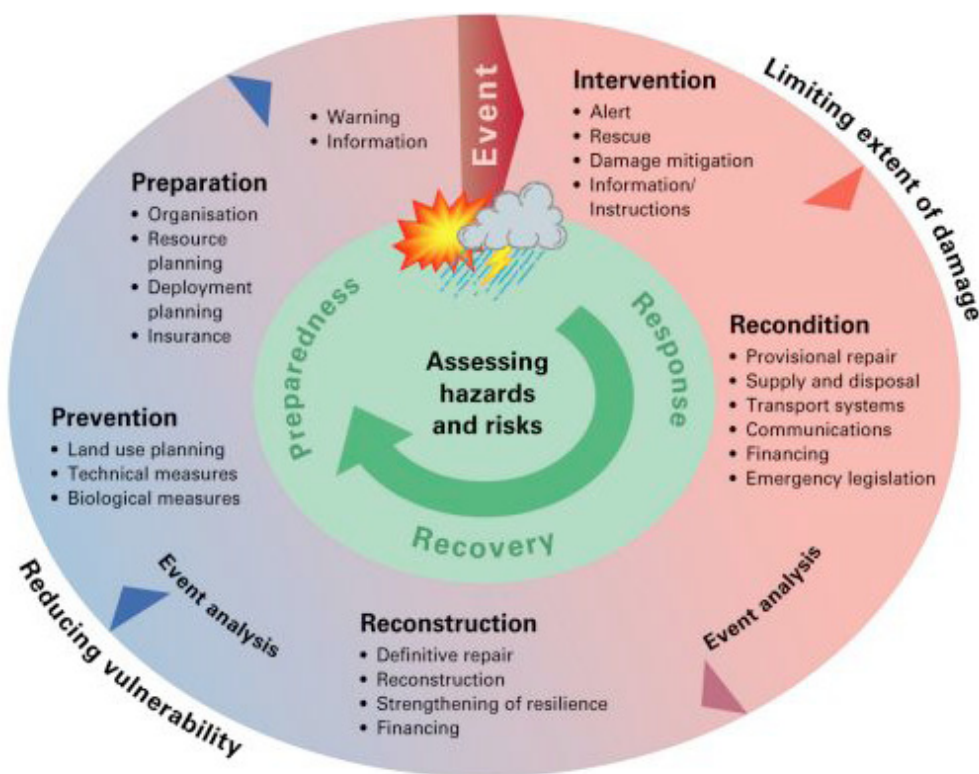
54 Ibid., p. 53

### 3 CONCLUSION AND RECOMMENDATIONS FOR SWITZERLAND

The Swiss approach resembles the four country approaches reviewed in the previous section. The process to come up with a national hazard analysis in Switzerland is called *Risiken Schweiz*, which is coordinated by the Federal Office for Civil Protection (FOCP).<sup>55</sup> In this context, a **hazard** is defined as to cover an event or development with potentially negative consequences and a **threat** is an acute, manifest hazard – the source can be unintentional or man-made. This potentially harmful event or development is de-

scribed in a concrete and detailed way by a **scenario**, following which risks within that scenario are evaluated using the ‘**risk-calculating model**’. This enables risks (within a particular scenario) to be quantified as the multiplication of the potential damage caused and the probability of occurrence. The overall process for dealing with risks is separable into the three phases of response, recovery and preparedness, with several sub-steps. This is called Integrated Risk Management (IRM) (see Figure 6).<sup>56</sup>

Figure 6: Integrated Risk Management, Federal Office of Civil Protection



55 Risiken Schweiz, <http://www.risk-ch.ch>.

56 Integrales Risikomanagement, available at: <http://www.bevoelkerungsschutz.admin.ch/internet/bs/de/home/themen/gefaehrungen-risiken.html>

Scenarios are theoretically central in all steps (depending on how they are used). In particular, scenarios are the basis of the risk assessment stage (middle part of Figure 6) and have a substantial role in planning response, recovery, and preparedness:

- ◆ In Switzerland risk **identification** principally covers the establishment of the hazards catalogue. In order to reach this catalogue of hazards, the first step is to list all possible hazards in order to choose those that seem most relevant. The procedure for developing such a list ranges from expert and/or practitioner brainstorming to learning from earlier actualization of scenarios, as the most accurate possible description of a hazardous event.
- ◆ In the second phase (risk **evaluation**), scenarios play a key role. Based on the hazards catalogue, three scenarios with different intensities is developed for each hazard. It is on the basis of the descriptions delivered in each of these individual scenarios that both the probability of their occurrence as well as their potential damage caused can be estimated. Thus, risk identification and then description of these risks in the form of a scenario delivers the basis for risk evaluation. In the Swiss context and in concurrence with its procedures, these descriptions focus on the two aspects of probability of occurrence and potential damage.
- ◆ Finally, it is on these two axes that the individual risks can be visualized. The resulting risk matrix allows comparing and prioritizing the individual risks. Thus, also risk **mitigation** as the response to the outcome of the above process is based on the descriptions of what and how potentially hazardous events actualize.

A recent survey by Bara<sup>57</sup> has shown that the Cantons in Switzerland use scenarios not only for their civil

protection planning activities, but also for hazards prevention and the evaluation of their individual coping potential. This means that scenarios are in principal material for all the different stages of civil protection policies and practices.

### 3.1 Systematic Model for the Use of Scenarios in Risk Assessment

Based on the information provided in this focal report, a systematic model for the use of scenarios in risk assessment can be generated. Though the number of steps (and their actual content) varies between countries, the underlying process behind all risk assessments equals or at least closely resembles the approach applied by the FOCP, though the terminology varies slightly. Figure 7 picks three core phases in which scenarios (can) play a key role— response, recovery, and preparedness.

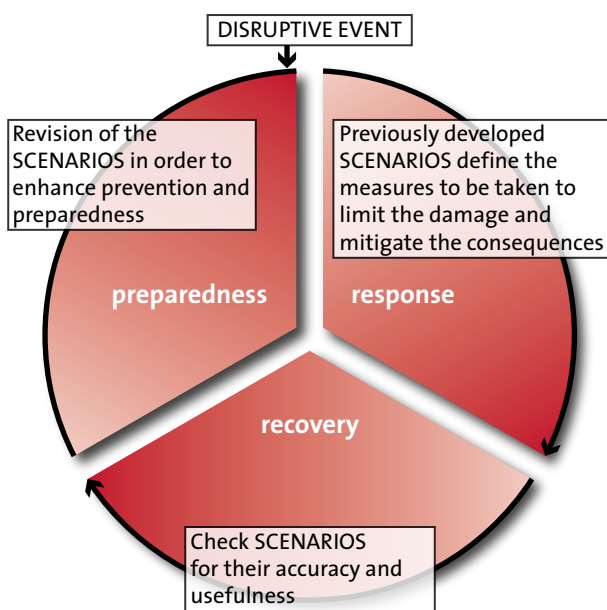
**Preparedness:** The third stage includes prevention and preparation, and should be the phase where the actual scenario planning process takes place. This includes updating previous scenarios to address changing conditions and context as well as developing new scenarios with associated response plans. Ideally, the scenarios developed at this stage will inform response plans and improve the effectiveness of future emergency/crisis response efforts.

**Response:** Adequate response can ideally rely on previously developed scenarios to help with improving situational awareness and implementing contingency plans. Drawing from previous scenario-based planning, officials can use that information and mental preparation to quickly identify appropriate response measures to take so to limit the damage and mitigate its consequences.

57 Bara, Corinne (2011), Risiko- und Gefährdungsanalysen im Bevölkerungsschutz. Eine Umfragestudie über laufende Arbeiten in den Kantonen, Center for Security Studies, ETH Zürich.

**Recovery:** Recovery is the next stage of the integrated risk management cycle and mainly covers regeneration from the event – including reconstruction and evaluation of the event. At this stage, scenarios are revisited and analyzed for their accuracy and usefulness. Overall, scenarios are checked for their accuracy and revised in order to adapt and better fit future circumstances and needs.

**Figure 7: Role of Scenarios in the risk-management cycle**



### 3.2 Final Remarks

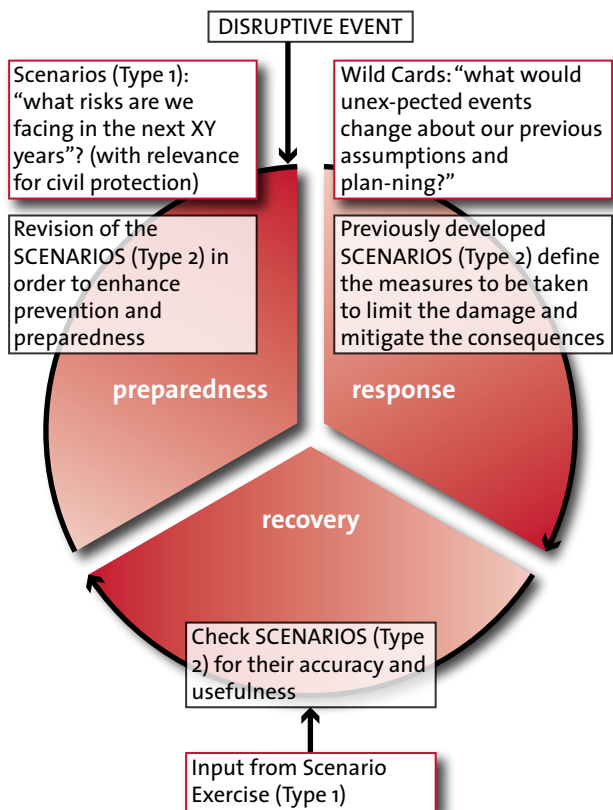
Given the fact that measuring the actual impact and effectiveness of the described approaches remains a major challenge, relatively little can be said about how better results could be achieved. This is still a developing field and thus it will take time for better indicators and measurement tools to be articulated. However, it seems noteworthy none of the evaluated countries systematically thinks about combining the two types of scenarios that we identified (i.e. scenarios for foresight and scenarios for risk assessment).

However, both approaches could potentially benefit from the other and foster improved (and institutionalized) exchange between experts trained to look into the future and those aiming to do risk assessment.<sup>58</sup> For example, the more future oriented scenario exercises would gain political standing through a clear link to policy and planning – and the more planning oriented scenario processes could get potential input about issues that are beyond “secure” knowledge and the projection of past experience.

In the Swiss context, a major change in the existing structure of individual projects with a future oriented character is unlikely. To note, there will be no overarching, institutionalized foresight or horizon scanning process beyond the Federal Chancellery’s new “Perspektiven 2025” process. Nonetheless, the *Risiken Schweiz* project could relatively easily tap into the potential of more future oriented scenario planning activities. While nothing needs to be changed with regards to the use of scenarios in accordance to what has been outlined above, additional workshops could provide different types of inputs that are directly conducive to the goals of the *Risiken Schweiz* project (see Figure 8):

<sup>58</sup> This statement is in line with Habegger’s findings with regard to Horizon Scanning from 2009. At the time, he sketched various ongoing projects in Switzerland with some link to foresight/Horizon Scanning, among them *Risiken Schweiz*. However, the study also clearly showed that these approaches were not integrated. Relatively little has changed since the publication of the 2009 study. Probably, the biggest change is the new scenario-based approach used by the Forward Planning Staff of the Federal Chancellery to identify the major future challenges facing Switzerland. Trends and scenarios have been established by a very diverse team of participants (the administration’s perspective staff (Perspektivstab der Bundesverwaltung), the project team, members from all government departments as well as external experts) in a five-phase process. The final report “Perspektiven 2025” serves as “an important source for the Swiss federal council to formulate an evaluation of the situation and basic issues for planning the legislative period.” See: Perspektivstab der Bundesverwaltung, <http://www.bk.admin.ch/org/udpg/01297/index.html?lang=de>

Figure 8: Role of Two Types of Scenarios in the risk management cycle



Such workshops could focus on the development of methodical and process expertise with regards to future studies (i.e. workshop on “wild cards” or emerging risks more generally) or be geared towards the active promotion of creativity and “out of the box” thinking to generate ideas and visions about emerging issues.<sup>59</sup> Optimally, these workshops should bring together different types of stakeholders from policy, academia and the private sector and should be led by scenario-professionals. In sum, this would result in a fruitful and cost-effective addition to the existing use of scenarios in risk management

59 Cf. Habegger 2009, op. Cit.

## 4 LIST OF REFERENCES

### 4.1 Government Sources

- Bundesamt für Bevölkerungsschutz und Katastrophenhilfe (2010), Methode für die Risikoanalyse im Bevölkerungsschutz, Bonn.
- Cabinet Office (2002), Risk: Improving government's capability to handle risk and uncertainty, Summary report, available at: [www.rdec.gov.tw/DO/DownloadControllerNDO.asp?CuAttachID=6278](http://www.rdec.gov.tw/DO/DownloadControllerNDO.asp?CuAttachID=6278)
- Cabinet Office (2008), The National Security Strategy of the United Kingdom: Security in an interdependent world, available at: [http://interactive.cabinetoffice.gov.uk/documents/security/national\\_security\\_strategy.pdf](http://interactive.cabinetoffice.gov.uk/documents/security/national_security_strategy.pdf)
- Cabinet Office (2010), Fact Sheet 2: National Security Risk Assessment, available at: <http://download.cabinetoffice.gov.uk/nss/nss-factsheet2.pdf>
- Cabinet Office (2010), National Risk Register of Civil Emergencies, available at: <http://www.cabinetoffice.gov.uk/sites/default/files/resources/nationalriskregister-2010.pdf>
- Cabinet Office, UK Resilience, see: <http://www.cabinetoffice.gov.uk/ukresilience>.
- Civil Contingencies Act 2004, available at: <http://www.legislation.gov.uk/ukpga/2004/36/data.pdf>
- Danish Emergency Management Agency (DEMA) (2006), Introduction and User guide. DEMA's Model for Risk and Vulnerability Analysis, available at: [http://www.brs.dk/fagomraade/tilsyn/csb/Eng/RVA/RVA-model\\_user\\_%20guide.pdf](http://www.brs.dk/fagomraade/tilsyn/csb/Eng/RVA/RVA-model_user_%20guide.pdf)
- Danish Emergency Management Agency (DEMA), Division of responsibilities regarding scoping future risks, available at: <http://www.brs.dk/fagomraade/tilsyn/csb/Eng/futurerisk.htm>
- Danish Emergency Management Agency (DEMA), see: <http://www.brs.dk/uk/>
- DEMA's Centre for Resilience and Contingency Planning, see: [http://www.brs.dk/fagomraade/tilsyn/csb/Eng/Civil\\_preparedness\\_division.htm](http://www.brs.dk/fagomraade/tilsyn/csb/Eng/Civil_preparedness_division.htm)
- Department for Business Innovation and Skills, Foresight: Our Impact, available at: <http://www.bis.gov.uk/foresight/our-impact>
- Department for Environment, Food and Rural Affairs, Flooding and Coastal Change, available at <http://www.defra.gov.uk/environment/flooding/>
- Foresight Horizon Scanning Centre (2009), Scenario Planning, London.
- Foresight Horizon Scanning Institute (2004), Future Flooding: Executive Summary, available at: [http://www.bis.gov.uk/assets/bispartners/foresight/docs/flood-and-coastal-defence/executive\\_summary.pdf](http://www.bis.gov.uk/assets/bispartners/foresight/docs/flood-and-coastal-defence/executive_summary.pdf)
- HM Government (2010), A Strong Britain in an Age of Uncertainty: The National Security Strategy, [http://www.direct.gov.uk/prod\\_consum\\_dg/groups/dg\\_digitalassets/@dg/@en/documents/digitalasset/dg\\_191639.pdf](http://www.direct.gov.uk/prod_consum_dg/groups/dg_digitalassets/@dg/@en/documents/digitalasset/dg_191639.pdf)
- HM Government (2006), Risk: Good Practice in Government (Vol. 2), available at: [http://www.hm-treasury.gov.uk/d/pu136\\_goodpractice\\_ingovernment\\_vol2\\_1106.pdf](http://www.hm-treasury.gov.uk/d/pu136_goodpractice_ingovernment_vol2_1106.pdf)



HM Treasury (2004), The Orange Book: Management of Risk – Principles and Concepts, available at: [http://hm-treasury.gov.uk/orange\\_book.htm](http://hm-treasury.gov.uk/orange_book.htm)

Ministry of the Interior and Kingdom Relations (2008), National Risk Assessment Method Guide, available at: <http://english.minbzk.nl/subjects?ActItdt=115647>

Ministry of the Interior and Kingdom Relations (2009), Guidance Methodology National Safety and Security Strategy, available at: <http://english.minbzk.nl/subjects?ActItdt=125930>

Schweizerische Eidgenossenschaft, Bundeskanzlei BK (2011), Perspektiven 2025: Lage- und Umfeldanalyse sowie Herausforderungen für die Bundespolitik.

## 4.2 Other Literature

Bara, Corinne (2011), Risiko- und Gefährdungsanalysen im Bevölkerungsschutz. Eine Umfragestudie über laufende Arbeiten in den Kantonen, Center for Security Studies, ETH Zürich.

Bründel, Michael (2009) The risk concept and its application in natural hazard risk management in Switzerland. *Natural Hazards and Earth Systems Sciences* 9(3): 801–13.

Center for Security Studies (2008). Gefährdungsszenarien auf Stufe Bund: Eine Umfragestudie über laufende Arbeiten im Bereich Risikoanalyse. Zürich: Center for Security Studies ETH Zurich.

Gullotta, Gulio (2008), Political Risk in Civil Protection – A Practitioner’s View, in: Beat Habegger (ed.): *International Handbook on Risk Analysis and Management. Professional Experiences*. Center for Security Studies, ETH Zurich, pp. 39–42.

Habegger, Beat (2009), *Horizon Scanning in Government: Concept, Country Experiences, and Models for Switzerland*, Center for Security Studies, ETH Zurich.

Habegger, Beat (ed.) (2008), *International Handbook on Risk Analysis and Management. Professional Experiences*. Center for Security Studies, ETH Zurich.

Knight, Frank (1921), *Risk, Uncertainty and Profit*, University of Chicago Press, Chicago.

Miller, Kent D. & H. Gregory Waller (2003), Scenarios, Real Options and Integrated Risk Management. In: *Long Range Planning* 36(1): 93–107.

Peterson, Karen Lund (2011) Risk Analysis – a Field within Security Studies? *European Journal of International Relations*. Prepublished August 23 as doi:10.1177/1354066111409770.

Pruyt, E. and D. Wijnmalen (2010), National Risk Assessment in The Netherlands: A Multi-Criteria Decision Analysis Approach. In: *Lecture Notes in Economics and Mathematical Systems*, 634(2), pp. 133–143, available at: <http://www.springer-link.com/content/160423960560140/>

Rademaker, Michael (2008), *National Security Strategy of the Netherlands: An Innovative Approach*, in: *Information & Security. An International Journal*, Vol. 23, No. 1.

Ringland, Gill (2002), *Scenarios in Public Policy*. John Wiley & Sons, Chichester.

Ritchey, Tom (2009), *Developing Scenario Laboratories with Computer-Aided Morphological Analysis*, Presented at the 14th International Command and Control Research and Technology Symposium, Washington DC, 15.-17. 6. 2009, available at: <http://www.swemorph.com/pdf/cornwallis3.pdf>.

Schoemaker, Paul J.H. and van der Heijden, Cornelius A.J.M.(1992), Case Study: Integrating Scenarios into Strategic Planning at Royal Dutch/Shell, in: *Planning Review*, 20:3, pp. 41–44.

Schwartz, Peter (1991), *The Art of the Long View: Planning for the Future in an Uncertain World*, Doubleday, New York or Miller.

Wenger, A., V. Mauer und Myriam Dunn Cavelty (2008), Preface, in: B. Habegger (ed.), *International Handbook on Risk Analysis and Management: Professional Experiences*, Center for Security Studies, ETH Zürich.

Wulf, Torsten, Meissner, Philip and Stubner, Stephan (2010), *A Scenario-based Approach to Strategic Planning – Integrating Planning and Process Perspective of Strategy*, Leipzig Graduate School of Management.