



**The Baltic Sea Region
methodology for risk and
capability assessments,
a first approach**



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Goals, protection values and functions
Capability to prevent
Vulnerabilities
Capability to respond
Prioritization of vulnerabilities and abilities

Introduction

These guidelines for scenario analysis are based on work with National Risk and Capability Assessment (NRCA) at the Swedish Civil Contingencies Agency (MSB). This document presents a short version of the Swedish guidelines and is prepared to form a basis for further development of the methodology within the Baltic Sea Region (BSR).

The purpose of the national risk and capability assessment is to identify and analyze risks, vulnerabilities and capabilities to prevent and respond to crises. National Risk and Capability Assessment (NRCA) forms a strategic basis for development of civil contingencies.

Many of the incidents analyzed in NRCA are associated with significant uncertainty, both in terms of likelihood and impact. Scenario analysis therefore plays a central role in assessing the ability to prevent and respond to crises. Scenario analysis can increase knowledge about what the needs are to reduce vulnerabilities and strengthen capabilities to prevent and respond to different incidents.

The aim of these guidelines is to contribute to developing a solid (and holistic) uniform scenario analysis. The goal is to develop guidelines that are user-friendly, practical, and create conditions for scenario analysis of good quality. Moreover, the guidelines are based on a method that can be used for assessment of impact and capability more generally (for example, in the evaluation of actual events and exercises).

The infographic on page 9 gives an overview of the six elements of the guidelines. In essence, the elements should be performed in the order they are presented in the guidelines. Several elements are however overlapping, e.g. assessment of vulnerabilities and gaps in capability (element 6) and identification of the overall capability to prevent and manage the event (element 2); the description of the scenario (element 3) and assessment of consequences (element 5); and the assessment of vulnerabilities and gaps in capability (element 6) and consequences (element 5).

The six elements of the guidelines

The infographic below provides an overview of how an assessment of influence on essential societal functions, consequences, vulnerabilities and capabilities are connected in the scenario analysis. Element 4 and 5 are strongly correlated and if element 4 is conducted in a thorough manner there will be less to do in element 5. What will be studied in the scenario analysis is basically how different actors will respond to the scenario. Based on that knowledge it will be possible to describe consequences, vulnerabilities and capabilities to prevent and respond to these types of incidents.

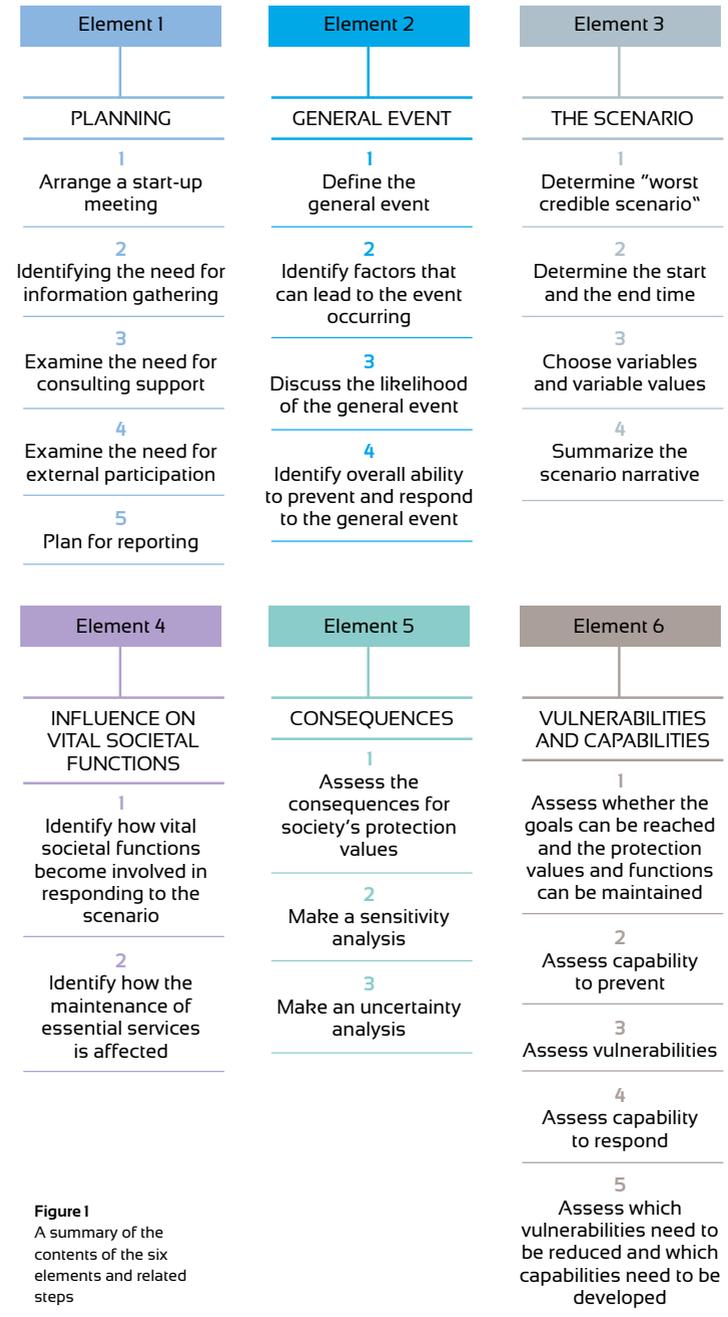
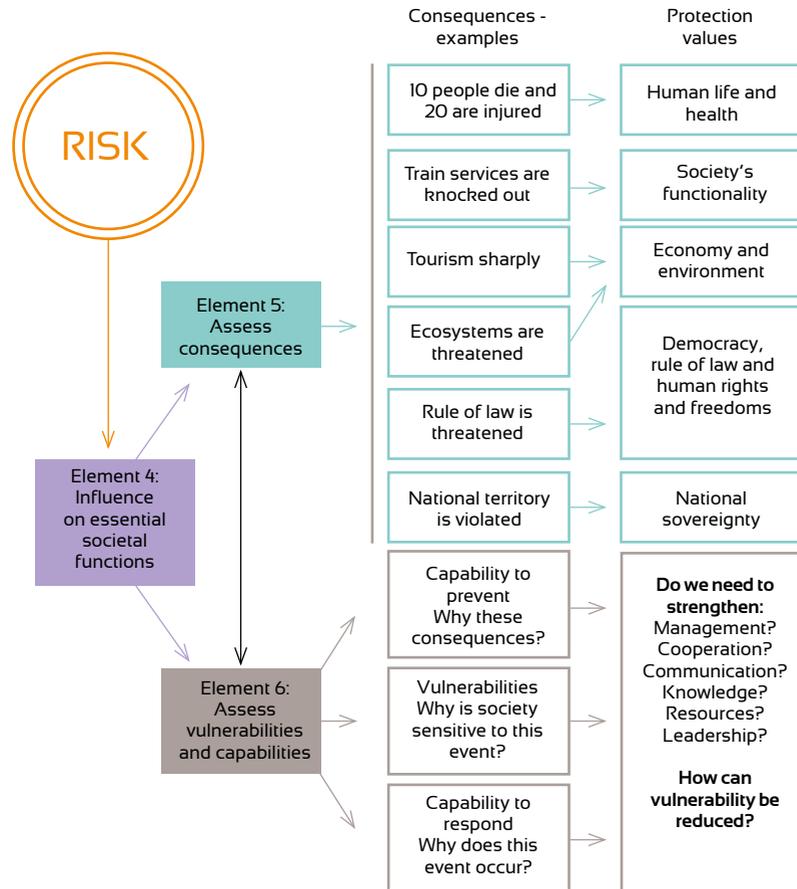
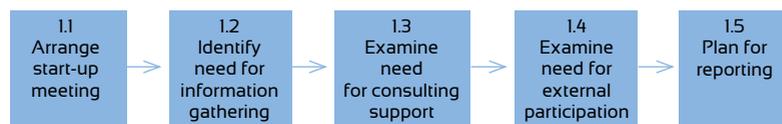


Figure 1
A summary of the contents of the six elements and related steps

Element 1 Planning

This section provides support when considering the planning of the scenario analysis:



Start-up meeting

A start-up meeting with those who will be involved in the analysis should be arranged. Questions that need answers are for example what skills, knowledge and resources are necessary for the the scenario analysis, if this is available in the organization or not and if the results will be fully or partially declassified.

Information gathering

Examine what information is available and what information needs to be collected and how. There are multiple ways of achieving this, for example through workshops, interviews, literature studies, risk and vulnerability analysis, research, evaluations and other studies.

Consultant support

It is useful to identify early if there is, any need for consultant support. However, it is important to understand why particular work is unable to be performed by the organization itself. The implementation of elements 4, 5 and 6 should primarily be carried out by internal staff in order to maintain and enhance skills and to communicate the results in an effective way. Describe and define any consultant needs carefully. Suitable missions can be for example the development of the scenario or the design and implementation of a workshop.

External participation

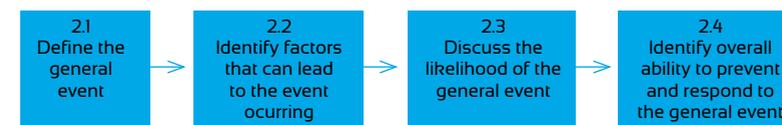
Scenario analysis often requires the participation of experts and stakeholders who would be involved in the handling of the scenario, or who would be affected by the disruption. Elements that often require external involvement are the development of the scenario and assessment of vulnerabilities and capabilities. This need should be identified at early stages of the work so that experts and stakeholders can be contacted.

Reporting

Decide who should be the responsible writer/editor, make decisions regarding how the anchoring will be achieved and how the results should be communicated. If the work is protected by confidentiality, this will require special communication considerations.

Element 2 The general event

Before creating a scenario, various aspects connected to the general event need to be identified. Element 2 includes the following steps:



The general event

Examine how the selected event is defined (scientific, operational or legal definition). What is the nature of the event? What does the events' course look like? What is the level of knowledge regarding the event? Has the event occurred or been simulated before in the country or in neighbouring countries? Who has responsibility for preventing and responding to this type of event?

Factors that can lead to the event

Identify the factors that potentially could cause the selected event to occur and lead to negative consequences for society. This may involve looking for special conditions in society (infrastructure, physical, social, economic, environmental, health, cultural, organizational or technical) or deficiencies in the prevention capability that can create favourable conditions for the increased likelihood of the event.

Likelihood

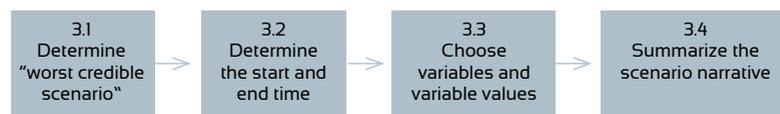
It is difficult to assess the likelihood of the kind of event analyzed in the context of a national risk- and capability assessment due to the fact that the events have either rarely or never occurred. This means that there are seldom statistics and experience to rely on. Hence, discuss the likelihood, however do not value it against a scale. If possible, use statistics and experience from previous events, knowledge about the factors that can contribute to this type of event (identified in step 2.2 above) as well as expert opinions.

Overall conditions to prevent and respond

In order to assess the consequences of the scenario, at a later stage of the analysis, it is necessary to conduct a general survey of the conditions in place, to prevent and respond to this type of event. For instance it is relevant to examine what plans are in place to respond to the event and how to maintain important societal functions. It is also important to examine roles and responsibilities linked to this kind of event, if there are procedures in place for establishing and conveying a common situational picture and if there are routines for how to inform the public about the situation. It is also important to identify which preventive measures and what steps have been taken to strengthen the coping capabilities.

Element 3 Develop a scenario

Once the necessary studies of the general event have been performed, it is time to create a scenario. The following steps are included:



Worst credible scenario

The scenarios in the NRCA are developed according to the principle of "worst credible" in order to challenge emergency preparedness. This means that, unlike the scenarios of the type "worst case", these scenarios have a large or very large impact and are at the same time realistic on the basis of expertise in the field. Expert authorities should be consulted to identify whether worst credible scenarios have previously been developed and analyzed. Discuss with experts how a worst credible scenario based on the event would appear.

Beginning and ending time

It is not always obvious when a scenario begins and ends. For scenarios with ongoing and accelerating negative consequences for society, so-called "triggers" have to be developed. This means that something sudden is introduced in the ongoing process, that accelerate or worsen the event. This becomes the starting point for the scenario. The final date is designated at the time when the sudden emergency situation subsides.

Variables and variable values

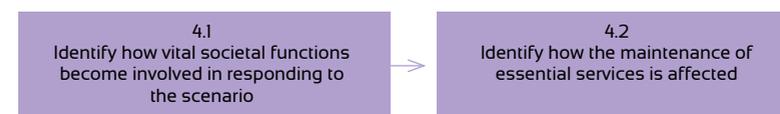
The scenario is built on a number of variables and variable values. There are a number of so-called fixed variables which usually (but not always) should be included in the scenario. In addition, a number of scenario-specific variables are usually required. Select variables and variable values based on the "worst credible scenario". Develop the scenario in light of current trends and long-term development of society. The selection of variables and variable values form the scenario, but can also serve as the basis for several other steps in the scenario analysis, such as discussion about likelihood, sensitivity analysis and uncertainty assessment.

Scenario narrative

Based on the information gathered in the previous steps, create a scenario narrative describing the scenario from start to finish.

Element 4 Influence on vital societal functions

This step includes identifying how vital societal functions become involved in responding to the scenario and how the scenario affects the capability to maintain continuity and functionality. The results of this survey will be the basis for the assessment of consequences, vulnerabilities and capabilities, i.e. steps 5 and 6. The following steps are included:



In their work on protection of vital societal functions and critical infrastructure, MSB has identified 11 societal sectors. These sectors include most of the essential functions of society as well as socially important operations. (see Table 1.1 overleaf)

Vital societal functions involved in responding to the scenario

Use the following sample questions and identify the functions and actors involved in responding to the scenario at various stages during the course of the scenario. Supplement if necessary with more questions.

- Will the warning system work? How will the various operators act after the initial warning?
- Will existing routines and plans for cooperation and coordination

be followed? Who will collaborate and cooperate with whom, and to what extent? How will the operators communicate? Will the procedures and guidelines for communication be followed? Will the operators manage to provide the general public with the necessary information?

- Will any operator take the leading role for one or several sequences of events?
- How will operators respond to the various stages of the scenario?
- What potential difficulties will the operators meet in responding to the scenario?

Societal sector	Examples of vital societal functions
Energy supply	Production & distribution of: electricity, local heating, fuel etc.
Financial services	Payments, access to cash, central payment system, securities trading etc.
Trade and Industry	Construction, retail, manufacturing etc.
Health, medical and care services	Emergency medical services, pharmaceutical and equipment supply, childcare, disabled and elderly care, primary health care, psychiatry, social services, disease control for animals and people etc.
Information and communication	Telephony (mobile & fixed), internet, radio communications, distribution of mail, production & distribution of daily papers, web site information, social media etc.
Municipal technical services	Drinking water supply, sewage treatment, sanitation, road maintenance etc.
Foodstuffs	Distribution, primary production, inspections and manufacture of foodstuffs etc.
Public administration: - Management functions - Support functions	Local, regional, national management, funeral services, diplomatic and consular services etc.
Protection, safety and security	The judiciary, prosecution service, military defense, prison service, coastguard, police, fire & rescue service, public safety access point (PSAP), customs & excise, border protection, immigration control, guarding and security activities etc.
Social security	Public pension system, sickness and unemployment insurance etc.
Transport	Air, rail, maritime, road and public transport etc.

Table I.1
Eleven Societal Sectors

Maintenance of affected functions

Identify how vital functions will be affected by the scenario and how relevant actors will act to maintain essential services. Use the questions below and add, if necessary, further questions:

- Which factors will impact the likelihood of maintaining essential services?
- Are there dependencies between sectors/functions/actors that need to be considered in further analysis?
- What potential difficulties exist for those involved in performing their duties?

Element 5 Assess consequences

Use the result from element 4, and assess the consequences of the scenario. Consequences relevant to the scenario should be described in a structured way. The assessment specifies the consequences of the specific scenario (not the general event) and is intended to form the basis for element 6. Consequences arising indicate that there may be vulnerabilities or deficiencies in the capability to prevent and respond and helps to understand the way in which the capability needs to be strengthened:



Assessment of the consequences are to be made at the societal level. It should be noted that consequences can spread across society due to dependencies between sectors, functions and activities. The consequences can be described in economic, quantitative or qualitative terms. Both direct and indirect consequences should be described. It should also be taken into account, that consequences occur in both the short and long term. Consequences arising so distant in the future that the uncertainties are very large, or consequences likely to be negligible, need not be considered.

Consequences for society's protection values

In light of the review of affected sectors see Table I.1 and the description of the overall ability to prevent and respond to the general event (element 2) what consequences can be expected to occur in society?

Consequences should be described in relation to the protection of the five societal values. In order to assess the consequences, each protection value has a number of indicators attached. See table 1.2 below.

Society's protection values	Indicators
1. Society's functionality	1.1 Energy supply
	1.2 Financial services
	1.3 Trade and Industry
	1.4 Health, medical and care services
	1.5 Information and communication
	1.6 Municipal technical services
	1.7 Foodstuffs
	1.8 Public administration: - management functions support functions
	1.9 Protection, safety and security
	1.10 Social security
	1.11 Transport
2. Human life and health	2.1 Inadequate fulfillment of basic needs
	2.2 Number of fatalities
	2.2 Number of severely injured/ill
	2.5 Number of persons requiring evacuation
3. Economy and environment	3.1 Damage to public and private movable and immovable property
	3.2 The value of lost production of goods and services
	3.3 Negative impacts on environmental quality objectives
4. Democracy, rule of law and human rights and freedoms	4.1 Negative impact on citizenship
	4.2 Negative consequences for democratic governance
	4.3 Negative consequences on legislation
	4.4 Negative consequences on judicial and administrative
	4.5 Negative consequences for trust and confidence
5. National sovereignty	5.1 Violation of national sovereignty
	5.2 Domestic order and security issues

Table 1.2
Society's protection values and indicators

Sensitivity analysis

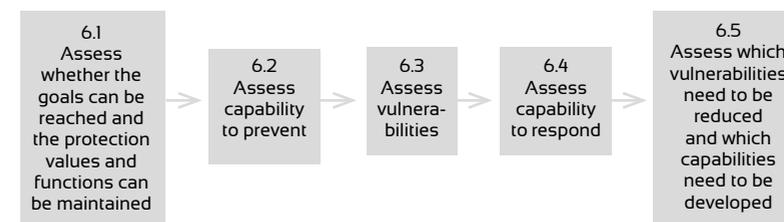
The analysis in element 4-5 is based on the specific scenario. If a variable value would be adjusted it would result in a different scenario. If an assumption regarding how a certain operator responds to the scenario is changed, it can result in different consequences. Therefore it is necessary to conduct a sensitivity analysis of the obtained results, i.e. how the results would be affected if one or more variable values, assumptions or external factors change.

Uncertainty assessment

Analyses of fictional scenarios are, for obvious reasons connected to significant uncertainties. This requires an uncertainty assessment to be made. The level of confidence regarding probability and consequences must be determined. An evaluation must be made regarding the reliability of the data on which the reasoning, analyses and projections are based.

Element 6 Assess vulnerabilities and capabilities

Element 6 is about assessing vulnerabilities and capabilities based on results from element 2, 4 and 5. The aim is to determine which vulnerabilities need to be reduced and which capabilities need to be strengthened in order to mitigate the kind of risk that the scenario represents. The following steps are included in the section:



Goals, protection values and functions

Determining whether the capability to prevent and respond to this type of event is sufficient or not, implicitly requires an assessment of the consequences and whether they are tolerable or not. This in turn requires some form of goal to relate to. In the absence of such established goals, a number of questions can be addressed:

Does the scenario challenge the objectives for public safety, the objectives for emergency preparedness or the five proposed goals for emergency

preparedness? Does the scenario cause difficulties in maintaining society's protection values? Does the scenario cause difficulties in maintaining one or more of the essential services exemplified in Table 1.1?

If the targets cannot be reached, there are deficiencies in the capability. This could also be the case if protection values or vital public functions, in any degree, cannot be maintained. There may also be vulnerabilities in society that contribute to the problems.

Capability to prevent

During element 2 (General event) a description of the general event was made as well as of the overall conditions to prevent and respond to the event. Now, based on the previous description, explain how prevention

Type of attribute or conditions	Examples
Infrastructural	energy (high dependence on electricity, inadequate supply of oil, etc.), food (low self-sufficiency), medicine (just-in-time systems), transport (dependence on electronic communications) etc.
Physical/technical	lack of capacity in the sewage treatment leading to problems in handling storm water and wastewater simultaneously, railway systems with high degree of utilization and on some routes lack of capacity, lack of housing (which can lead to lower degree of self-sufficiency) etc.
Social	low education, high unemployment, high percentage of elderly, low confidence in public authorities, urbanization, lack of personal responsibility for emergency preparedness, large car-dependency etc.
Economic	high debt and low savings (can lead to financial distress and to households' exposure to increases in macroeconomic fluctuations), high public debt, etc.
Environmental	Major hazardous emissions, sensitive ecosystems vulnerable to stress, over use of natural resources
Health	Lack of exercise, lifestyle diseases, smoking, alcohol, drugs, poor diet, etc.
Cultural	diminishing societal trust, inadequate language skills, high sense of alienation etc.
Organisational	Unclear responsibilities in crisis etc.

Table 1.3

in relation to these kind of events need to be strengthened. What shortcomings in preventive work lead to conditions arising that might cause a similar event to occur?

Vulnerabilities

Also in this step, there are links to element 2 in which the potential factors that could cause the general event to occur were identified. The task is to assess whether there are vulnerabilities in society that makes it more exposed to these type of events. Use supporting examples from the Table 1.3

Capability to respond

Determine what in the response phase contributes to the impacts described in the previous step. Determine in which ways are the response actions insufficient? Why?

Prioritization of vulnerabilities and abilities

The scenario analysis is likely to point out the need to both reduce vulnerabilities and to strengthen capabilities to prevent and respond. However, total prevention and deterrence of the consequences are unlikely, if nothing else due to financial constraints. Therefore, it is important to determine what is most essential to improve and take measures where they are most cost efficient.

If there were measurable goals for the maintenance, all important societal functions measures that would help achieve these goals in a cost-effective way should be prioritized. In the absence of such, consider the following questions: What vulnerabilities or gaps in capability are particularly essential for the outcome of this scenario? Can a reduction in vulnerabilities or strengthening of capabilities significantly improve the ability to maintain one or more vital societal function, reduce risks or help protect one or more of the societal protection values? Are there actions that can result in a substantial strengthening of one or more of the identified capabilities in a cost-effective way? Is there actions that can contribute to a substantial reduction of one or more risks simultaneously?



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