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Evaluating the Dutch National Risk Assessment: Drawing Lessons from a Comparison with European Counterparts

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Evaluating the Dutch National Risk Assessment

Drawing Lessons from a Comparison with European Counterparts

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Preface

The research at hand has been conducted by the author during an internship at the Dutch National Institute for Public Health and the Environment (RIVM). It represents the final part of the Master programme in Public Administration at the University of Nijmegen.

The purpose of this thesis is to perform an evaluation of the 2016 Dutch National Risk Assessment (*Nationaal Veiligheidsprofiel* in Dutch). It does so by assessing and comparing the underlying assumptions found in Dutch risk assessment with those found in its Norwegian, Polish, Swedish and Swiss counterparts in light of a normative framework.

The author would like to acknowledge and thank three people in particular that have offered valuable support in the production of this thesis. First of all, the author would like to thank both Stephanie Meulenbelt and Leendert Gooijer for providing him with the opportunity to conduct this research by way of an internship position at the RIVM as well as for their guidance and feedback. Second, the author would also like to express his gratitude to Dr. Johan de Kruijf for his assistance and feedback during the entire thesis track.

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List of Abbreviations

ANV	National Network of Safety and Security Analysts
DSB	Norwegian Directorate for Civil Protection
CHNRA	Swiss National Risk Assessment
CMO	Context – Mechanism – Outcome (Model)
EU	European Union
MSB	Swedish Civil Contingencies Agency
MSSD	Most Similar Systems Design
NLNRA	Dutch National Risk Assessment
NONRA	Norwegian National Risk Analysis
NRA	National Risk Assessment
OECD	Organisation for Economic Co-operation and Development
OFPP	Swiss Federal Office for Civil Protection
PLNRA	Polish National Risk Assessment
RCB	Polish Government Centre for Security
RIVM	Dutch National Institute for Public Health and the Environment
SENRA	Swedish National Risk Assessment
SNV	Dutch National Safety and Security Strategy

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1. Introduction

Risk is something that is all around us and can have a defining impact on our daily lives. On the one hand, risk can be seen as something that has the potential of harming a person's well-being. Common examples are the risk of being involved in a car accident or of contracting a tropical disease when on holiday. On the other hand, however, taking a certain amount of risk can potentially result in high payoffs and a notable increase in well-being. Consider the risk you take when buying a lottery ticket or setting up a small business. There is the danger of losing everything you initially invest, but also the possibility of gaining considerably more (Aven, 2011, p.35). When discussing these individual risks, the concept is often defined as the probability of something occurring times the potential impact of the event in question (Muller, Helsloot & van Wegberg, 2012).

Next to the risks we face on a more individual basis, there are also hazards that threaten society as a whole. When speaking of societal risks, one should consider events such as terrorist attacks, nuclear accidents or large-scale blackouts. One can imagine that accurately determining and analysing societal risks can be a very time-consuming and complicated undertaking. Whereas determining individual risk can be a relatively straightforward exercise, an analysis of societal hazards requires the consideration of different scenarios, the behaviour of the multitude of actors and stakeholders present in society as well as the impact of autonomous developments such as climate change (ANV, 2016a; Van Asselt & Renn, 2011, p.346). Despite these challenges, multiple national governments have conducted societal risk assessments, often with the purpose of not only better understanding the risks that threaten society, but also to help determine how to best face these different threats (Aven & Cox, 2016, p.187). In the Netherlands, the National Network of Safety and Security Analysts (ANV) is responsible for compiling the Dutch National Risk Assessment (NLNRA), the latest version of which was released in 2016. The document contains an overview of potential manmade and natural hazards that can threaten Dutch society and compares them to each other in terms of both likelihood and impact. The NLNRA provides policymakers with a comprehensive overview of different risks and enables them to better decide if and where resources aimed at risk mitigation should be deployed (ANV, 2016a; RIVM, 2016).

The NLNRA in its current form originates from a long pedigree of initiatives aimed at assessing and strengthening national security. In 2007, the National Safety and Security Strategy ("Strategie Nationale Veiligheid") or SNV originated the practice of conducting risk assessments in the Netherlands. The strategy was developed to facilitate a comprehensive approach towards different national security challenges such as terrorism, epidemics and climate change that are becoming increasingly intertwined

with each other and aid policymakers and politicians in making well-founded decisions (Ministerie van Justitie, 2007, p.6-7). The SNV is still in place and consists of three interrelated stages. The first stage is the identification and analysis of risks that threaten Dutch society, part of which is the production of the NLNRA. The second phase is a capability analysis focussed on whether there are enough resources available to address high-priority risks, resulting in an advice on required policy measures. The final stage consists of implementing recommended actions (Pruyt & Wijnmalen, 2010, p.133-134). The SNV was one of the first of its kind internationally (Ministerie van Veiligheid en Justitie, 2015, p.2).

The first NLNRA was published in 2008 by a consortium of different ministerial departments under the auspices of the then Ministry of Justice (Ministerie van Justitie, 2008). Similar to the 2016 edition, the preceding editions analysed the impact of different risks on five national security interests: territorial, ecological and economic security as well as physical safety and, finally, social and political stability (Mennen & Van Tuyl, 2015, p.861-862). There are a also number of key differences between the current 2016 NLNRA and its predecessors, of which the last one was produced in 2014 (ANV, 2014). Some of these differences are featured in figure 1.1 below.

2014 NLNRA	2016 NLNRA
Scenario specific approach	Thematic approach allowing for more information on current capabilities and scenario context
Released on an annual basis	Released every four years
Limited attention for autonomous developments	More attention for autonomous developments such as climate change
Ten impact criteria	11 impact criteria including a new one covering the violation of the vitality of the Dutch economy

Figure 1.1: Key differences between the 2014 and 2016 NLNRAs. Based on Ministerie van Veiligheid en Justitie, 2015, p.2

In 2011 the newly established ANV received the mandate for the production of the national risk assessment. The main reason for this handover of responsibilities being that the ANV can be more independent in identifying and processing scenarios than the different ministerial departments (ANV, 2011, p.9). More information on the ANV can be found in attachment five.

Of course compiling a national risk assessment is not solely a Dutch prerogative. Many other national or regional administrations have performed similar exercises and the European Commission even encourages member states to do so (European Commission, 2010). However, every country brings its own unique context from which the exercise of creating a national risk assessment (NRA) is conducted. In every national context there may be, for example, a different view on the meaning of the

concept of risk or on citizen responsibilities. This context is important in determining which risks are included in what manner in the NRA and which underlying assumptions will be triggered in compiling it, in turn having a distinct impact on the eventual contents of the assessment document (Pawson & Tilley, 1997). The thesis at hand will analyse the different underlying assumptions used in the production of five European risk assessments and assess to what extent they are in line with the theory-based normative framework adopted by this research. Following this the results of these assessments will be compared. The purpose of this thesis is to explore whether there are any lessons the ANV can learn from the underlying assumptions contained in the other four European risk assessments, with the aim of improving the next version of the NLNRA. Consequently, it will serve as an evaluation of the underlying assumptions of the NLNRA.

Next to the NLNRA, two assessments from within and two assessments from outside of the EU have been selected for this analysis: Sweden, Norway, Switzerland and Poland. More on the selection of these four countries in section 1.3. The overall comparison will be based on the Context-Mechanism-Outcome (CMO) model of evaluation. Within this overarching model, all NRAs will be assessed on three specific areas concerning their underlying assumptions, followed by a comparison of the results: whether a comprehensive view on national security is adopted, how the concept of risk has been approached and, finally, if and how the behaviour of citizens in the face of risk and disaster has been taken into account. In addition to the above analytical component, this thesis will also feature a discussion on some of the main properties of national risk assessments, providing a more general overview of the topic at hand. Preceding the discussion on main properties and the analysis of underlying assumptions, the theoretical foundations of the normative framework as applied by this research will be introduced. Finally and following the country chapters on underlying assumptions, an overview of differences and similarities will be presented. Concerning this introductory chapter, section 1.1 will introduce the main research question as well as the sub-questions of this thesis. The different theories on which the three points of comparison are based will be briefly presented in section 1.2 and the methodology used to conduct the analysis will be explained in section 1.3. The final section will discuss the relevance of the topic.

1.1 - Research Question and Sub-Questions

This thesis is structured around a single main research question and a number of related sub-questions. Its main objective is to achieve a better understanding of the underlying assumptions used in the production of European NRAs, in order to identify possible points of improvement for the next version

of the NLNRA to be produced by the ANV as part of the SNV. The aim of this thesis is not to compare the different risks faced by the individual countries or their potential impact on society, but rather to focus on the underlying assumptions that have led to these results. The following main research question will be answered: How does the quality of the underlying assumptions used in the production of the NLNRA compare to that of European counterparts? As mentioned before, this thesis will focus on underlying assumptions related to three specific points: whether a comprehensive view on national security is adopted, how the concept of risk has been approached and, finally, if and how the behaviour of citizens in the face of risk and disaster has been taken into account. The quality of the underlying assumptions will be assessed by way of a theory-based normative framework, the operationalisation of which will be explained in section 1.3.

Three sub-questions have been formulated to help guide this thesis in answering the main research question. The first sub-question is aimed at gaining a better understanding of both NRAs in general as well as the five specific initiatives discussed in this thesis and reads as follows: What are the main properties one can expect to find in a national risk assessment? The answer to this question will be based on an examination by the author of main properties of the five NRAs featured in this thesis. It will be examined how four basic elements which are essential for the shape, aim and content of a NRA have been incorporated in the five documents: the main purpose of the document, the relation between national and regional risk assessment initiatives, the structure of the different scenarios used within the documents and the way risks are graphically compared. The second sub-question moves away from main properties and focusses on the underlying assumptions of the different NRAs and assesses them by way of the normative framework. This yields the following question: What are the main underlying assumptions found in the five national risk assessments with respect to the three points on which it will be examined and to what extent do these assumptions align with the normative framework? This sub-question will be translated into a country specific question used to structure the discussion in all of the five country chapters on underlying assumptions. The third and final sub-question concerns the alignment of these assumptions found in the five assessments with the normative framework and is as follows: What are the main differences and similarities between the underlying assumptions found in the five risk assessments in terms of their alignment with the normative framework? By way of the above sub-questions, this research will be able to provide an answer to the main research question. Based on the final conclusions, a number of points of recommendation for future versions of the NLNRA will be formulated. The next section will introduce the different theories that underpin the normative framework.

1.2 - Theory

There are two ways in which this thesis makes use of a theoretical framework. First of all, there is the overarching CMO model of evaluation which is used to structure the entire comparison. Second and within the confines of this model, there are the different theories that form the foundations of the normative framework. This framework contains the theoretical insights behind each of the three points on which the underlying assumptions of the five NRAs will be assessed and compared. Both will be briefly introduced here, followed by a more extensive discussion in chapter two. The way the normative framework will be operationalised is discussed in section 1.3.

The CMO model is based on the *Theory of Realistic Evaluation* as originally developed by Ray Pawson and Nicholas Tilley (Pawson, 2002). The theory adopts a different perspective from other evaluation theories due to its focus on context. It does not ask whether policy A leads to result B, but rather in which specific context policy A leads to either outcome B, C or D. Put differently, one of the core insights of realistic evaluation and with it the CMO model is that different contexts lead to the activation of different mechanisms, which in turn translate into different outcomes (Tilley, 2000). Graphically, the CMO model can be summarised as seen in figure 1.2 below

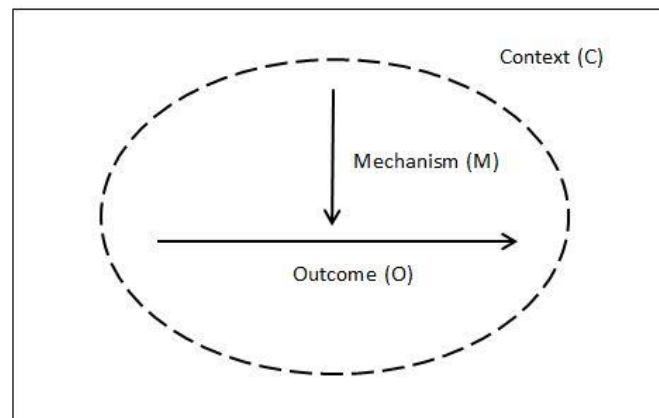


Figure 1.2: The CMO model. Based on Pawson & Tilley, 1997, p.72.

The CMO model of evaluation is particularly suited for analysing specific policy interventions such as the levying of additional taxes. However, it can also provide a valuable tool for structuring the research at hand, due to the acknowledgement of the strong connection between context, mechanism and outcome. In each of the different national contexts, the same question concerning the creation of a NRA is being approached in a different manner. Different mechanisms or in this case assumptions are

triggered which in turn lead to a specific outcome, the respective NRAs. This research will focus on the content of these different mechanisms by way of a comparison.

As mentioned above, the five NRAs will be analysed, assessed and compared on a number of specific points related to underlying assumptions within this overarching CMO model. Each of these three points is based on different theoretical insights. The first point concerns whether the different assessments have adopted a comprehensive view on risk and security. The majority of NRAs are aimed at mapping risks that can potentially have an effect on national security. Within academia, a number of authors have stated that national governments tend to adopt a too narrow a definition of the concept of national security, focussing solely on military and geopolitical issues whilst mostly ignoring ecological, economic and social interests. Instead of this narrow focus, they advocate for a more comprehensive approach towards national security (Romm, 1993; Paleri, 2008, p.66; Chandra & Bonsle, 2015, p.337-339). This research will assess whether the five assessments have in fact adhered to this appeal by examining if they have included issues other than territorial and geopolitical interests. Special attention will be given to the subjects of ecological stability, the stability of the digital environment and cultural heritage as specific interests. The reasons for explicitly discussing their inclusion will be explained in chapter two. The second point refers to how the concept of risk is defined and operationalised. The notion of risk lends itself to a plethora of different interpretations, ranging from the very technical definition of probability times impact, to the social-constructivist notion that argues risk is by its very nature a subjective, socially constructed concept (Society for Risk Analysis, 2015; Muller, Helsloot & Van Wegberg, 2012; Douglas & Wildavsky, 1983). The way the different national assessments define, determine and compare risks will be assessed from the perspective of insights provided by social-constructivist theory. The third and final point refers to the question if and how the behaviour of citizens in the face of risk and disaster has been taken into account. Research has shown that citizens often act rationally and appropriately during and immediately after disasters, not only looking after themselves but also after their neighbours (Scholtens & Groenendaal, 2011, p.21-22). This behaviour can have a substantial dampening effect on the impact of risks when they materialise. However, the same researchers argue that this potential effect is often not taken into account by national governments (Helsloot & Ruitenberg, 2004, p.103-104; Scholtens & Groenendaal, 2011, p.21-24). This research will assess if and how the five initiatives have incorporated citizen behaviour. All three points as well as the CMO model will be discussed more extensively in chapter two. The next section will continue with a discussion on methodological matters and operationalisation of the above theories.

1.3 - Methodology

This section consists of three parts, the first part discusses the way the four European counterparts to the NLNRA have been selected. The second part explains the general methodological approach adopted by this thesis and the final part presents the accompanying methods and the way the theoretical framework will be operationalised. Starting with the selection process, the first step has been the compilation of an overview of NRAs that could possibly be included in this thesis. The overview document in question can be found in attachment one. In the creation of this overview, all 28 EU member states plus Iceland, Norway and Switzerland were considered. The main reason for limiting the possible scope of this research to these 31 countries can be found in the fact that its aim is not to initiate a complete overhaul of the NLNRA methodology, but rather to further refine it. As all 31 countries, with the notable exception of Switzerland, are part of the EU civil protection mechanism and the 28 EU member states amongst them have had the opportunity to rely on the European Commission for guidance in setting up their own national risk assessment, the overall shape and content of the different documents is somewhat comparable due to mutual exposure to both guidelines and initiatives (European Commission, 2010; European Commission, 2016). Even though large differences do still exist, a meaningful and in-depth comparison on a number of key points is facilitated by preselecting countries that, to an extent, can be expected to at least share a common general approach to producing a national risk assessment. This approach of highlighting differences by comparing units that are seemingly similar concerning other variables is in accordance with a Most Similar Systems Design or 'MSSD' (Ancker, 2008, p.389-390). Due to its geographical proximity as well as its cultural and economic linkages with the surrounding EU countries and informal connections with European civil security initiatives, Switzerland has also been included (FDFA, 2017; Hegemann & Bossong, 2013, p.29).

Following the compilation of the initial overview document, a number of criteria were applied in order to determine the suitability of each of the NRAs for inclusion. First of all, the document had to be both accessible to the researcher as well as available in a language that he could understand. Out of 31 countries, 19 failed to meet these criteria. This does not necessarily mean that the country in question did not produce a risk assessment at all. It merely indicates that the researcher was not able to retrieve it using English or occasionally French keywords. This can be due to language problems, the document in question being classified and thus not publicly available or, indeed, the document not existing. The remaining 12 documents could be divided into two specific categories: those that merely enumerate different risks and those that conduct both a risk analysis as well as a risk comparison. Since the NLNRA belongs to the latter category and as this kind of NRA is better suited for an analysis of underlying

assumptions, only those assessments that also conduct a risk comparison were considered. This resulted in seven suitable country cases next to the Netherlands: Poland, Norway, Sweden, Finland, Denmark, the United Kingdom and Switzerland. However, for a meaningful and in-depth comparison within the confines of a Master thesis, the number of cases had to be lowered to a maximum of five, including the NLNRA. In order to include both EU and non EU member states as well as prevent a comparison featuring solely Scandinavian countries, the following four NRAs have been selected: Norway, Sweden, Poland and Switzerland. Poland has been selected at the expense of the UK because even though both documents are partially classified, there is more publicly available information on the Polish assessment. As mentioned before, the compilation document on which the above discussion has been based can be found in attachment one.

In order to help analyse the five risk assessments, this thesis has chosen to adopt a multiple case study methodology. This approach has been selected because a comprehensive assessment and comparison of underlying assumptions requires an in-depth examination and understanding of its units of analysis. There is a reason the assumptions are awarded the pronoun 'underlying'. A multiple case study methodology facilitates this in-depth understanding by providing a more comprehensive view of the units of analysis (Gerring, 2006, p.49). Second, this particular thesis is aimed at generating recommendations for the 2020 NLNRA and, thus, is focussed on learning lessons drawn from the comparison with Europeans counterparts and the extent to which their underlying assumptions align with the normative framework. In order to draw lessons from something, one first has to understand it. Again, this deeper understanding can be better achieved through a case study design than for instance a large-N statistical analysis. Consequently, the results of this research have been based on an in-depth case study of each of the five NRAs. All five case studies are of an interpretative nature according to Lijphart's typology of case studies. This means that, from the perspective of a theoretical framework, some of the key features of a particular NRA are analysed without drawing conclusions on the overall validity of the theories themselves (Lijphart, 1971, p.691-692).

There is one commonplace argument against the use of case studies needs to be addressed before moving on. Researchers using a multiple case design are often accused of selection bias when it comes to determining which cases to include in their research and which ones to ignore. Critics state that researchers tend to select their cases based on the dependent variable of whatever causal relation it is they want to research (Bennett & Elman, 2006, p.460-461). This means that cases are selected based on whether they fit the expected results contained in the researcher's theoretical framework, leading to biased results on the universal validity of the theory in question. As seen in the first part of

this section, this thesis has aimed to avoid this selection bias by being as transparent as possible in the selection process and basing the inclusion or not of the different NRAs on objective criteria such as accessibility and language.

Multiple methods have been used for analysing the five cases. The core of this multi method approach is an extensive document review of the five NRAs themselves as well as any accompanying government publications. Even though most of the assessment documents are already quite extensive, additional information has also been retrieved through a review of relevant literature such as academic publications or external evaluations as well. The availability of these sources however differs per NRA. Furthermore, In the case of the Polish assessment, an additional questionnaire was send to the responsible government agency. As the Polish document is partially classified, an additional method was required in order to provide sufficient information. A questionnaire was preferred by the Polish Government Centre for Security. Finally, an extensive semi-structured interview has been conducted by the researcher with one of the key figures involved in the production of both the current as well as some of the previous NLNRAs. As the evaluation of the NLNRA is the main subject of this thesis, it was deemed appropriate to acquire additional information on this particular NRA by way of the above interview. However, as only one questionnaire and one interview have been conducted, the basis of this research is still the above analysis of documents and literature. This means that the results of this thesis are based on the author's interpretation of the different documents and are thus more vulnerable to bias than when predominantly based on interviews or questionnaires. In order to address this issue, the author has endeavoured to be as transparent as possible in relation to the way these results are reached and what they are based on throughout the thesis. In order to assist in achieving this transparency, an overview of consulted documents and literature will be provided at the beginning of each of the country chapters on underlying assumptions, together with more precise references in text. The interview questions and the questionnaire can be found in attachments three and four.

The above methods help determine to what extent the five NRAs are in line with the normative framework. As mentioned before, this degree of alignment will be assessed on three specific points. For each of these points a set of questions has been formulated based on the aforementioned framework. The theoretical basis of all of these questions as well as when a NRA can be seen as being in line with the normative framework is discussed at length in chapter two. The first point focusses on whether a NRA has adopted a comprehensive view on risk and security. It will be operationalised by asking if other interests than sovereignty have been taken into account in the NRAs and whether these have been included in an equal manner relative to each other. Sovereignty is defined as the exclusive authority of a

state over its own territory (Rood, 2012). Special attention will be awarded to whether the subjects of the stability of the digital environment, cultural heritage and ecological stability have been included, meaning that they are seen as an interest in their own right and not whether a scenario covering these topics has been produced. The reasons for explicitly considering these subjects will be explained in chapter two. The second point of analysis examines to what extent the different national risk assessments incorporate elements of a social-constructivist approach to risk. This research will, first of all, ask how each of the assessments defines the concept of risk and whether they, in general, acknowledges subjective elements related to it. Second, this thesis will ask what methods are used in order to determine risk as well as if and how methodological limitations are addressed. Finally, whether qualitative or quantitative scales are used for determining the impact and likelihood category of a scenario will be discussed. The third point analyses to what extent the different national risk assessments have taken into account research on the potential impact of citizen behaviour during and immediately after accidents and disasters. It will be asked whether the impact of citizen behaviour has been incorporated in the data used to compile the NRA and to what extent the agency of citizens is acknowledged in the different scenarios as well as throughout the document. Agency refers to the ability of citizens to make conscious decisions on their own behaviour (Deacon & Mann, 1999, p.). When recognising citizen agency, one acknowledges them as being an actor capable of influencing a particular situation or course of events.

The final topic to be discussed here is how the overarching CMO model within which the above assessments and eventual comparison will be conducted is operationalised. Figure 1.3 shows how this will be achieved.

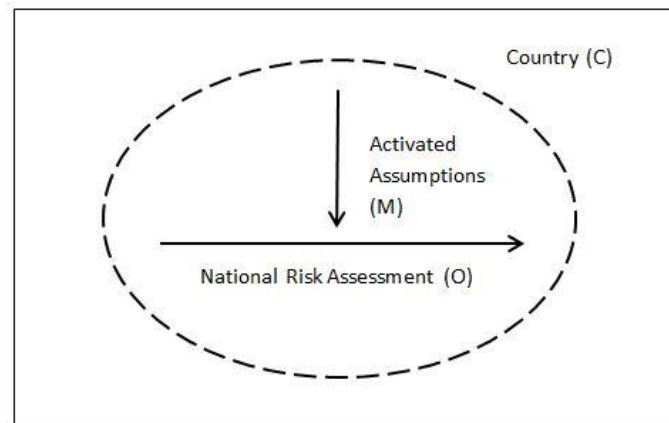


Figure 1.3: The CMO Model Applied to National Risk Assessments

It is safe to assume that every country has its own unique pre-existing social background. In the case of this research, the mechanism element of the CMO model can be found in the underlying assumptions that have been activated and used in producing the respective national risk assessments. These assumptions have been based on the national context in which the risk assessments were produced. Finally, the different national risk assessments can be seen as the outcomes of both the national context and the activated underlying assumptions. This thesis will examine and compare the different underlying assumptions (M) that have been activated in each of the national contexts (C) in the production of national risk assessments (O). The main focus of this research will be on the different mechanisms and how they have led to different outcomes, thus the 'M' and the 'O' will receive the majority of attention. Despite the fact that context (C) helps determine which of these mechanisms are in fact triggered, it is beyond the scope of this thesis to feature a comprehensive analysis of the institutional arrangements, cultural properties and value orientations that make up this context in each of the five countries. Furthermore, even when this could be achieved, it would be challenging to pinpoint which specific cultural or institutional elements can be seen as responsible for the activation of a certain mechanism. Instead, this research has opted to work from the assumption that the five different contexts differ from each other and that it is these differences which have in turn led to the mechanisms and outcomes which will be analysed in the country chapters. Evidence for the assumption that the Swedish, Norwegian, Dutch, Polish and Swiss contexts vary from each other can be found in the fact that they each score differently on the six dimensions of national culture as defined by Geert Hofstede (Hofstede, 2017). Of course, when relevant for the analysis, elements of the national context will be discussed in the country case studies.

1.4 - Societal and Scientific Relevance

The last question to be answered in this introduction is by no means the least important one. When discussing the relevance of this research, a distinction should be made between scientific relevance on the one hand and societal relevance on the other. Starting with the former, a number of reasons can be found in support of the scientific relevance of this thesis. First of all and as pointed out by Terje Aven (2016, p.2), there are relatively few scientific publications that discuss the practical application of risk assessment theories and methodologies. By examining how risk assessment is put in into practice in different countries by way of an analysis of underlying assumptions, this thesis addresses a topic which has seen relatively little research. Second, existing scientific publications aimed at analysing national risk assessments, usually tend to focus on just one document or only feature a comparison between two

countries. An example of such research can be found in a study conducted by A. Tammepuu and K. Sepp (2011) on the differences and similarities between the Estonian and British national risk assessments. The research at hand, analysing and comparing five different NRAs, features a larger N size than usual, representing a partially different approach to comparing national risk assessments with possibly different results. Turning to societal relevance, this project may assist the National Network of Safety and Security Analysts in producing a further refined version of the NLNRA. The better and more accurate the document is, the more valuable it can be for policy makers in determining national risk strategies and identifying areas that are in need of additional attention or resources. Through the suggestions it will make for improving the NLNRA, this research can thus help the ANV to better prepare and inform Dutch politics and society concerning the risks they may have to face. As Marjolein van Asselt and Ortwin Renn (2011, p.442) put it in their paper on risk governance: "It is important that the actors and institutions involved [in risk governance] reflect on what they are doing."

The next chapter will start with a more extensive description of the different theories applied in this thesis. Following this, chapter three will discuss the main elements of the five risk assessments. Chapters four through eight feature the assessments of underlying assumptions found in each of the NRAs on a country by country basis. Chapter four will focus on The Netherlands, chapter five on Sweden, chapter six on Norway, chapter seven on Switzerland and, finally, chapter eight is to discuss the Polish NRA. Chapter nine will provide a summary of the main differences and similarities between them. Chapter ten will provide a formal answer to the main research question as posed in this introduction, identify possible lessons for the next version of the NLNRA and present some general points of discussion.

2. Theoretical Framework

The practice of assessing risks and making decisions on the basis of that analysis has been around for over 2000 years, dating back to the ancient Greeks (Aven, 2016, p.1). Over the course of two millennia, a wide diversity of views, opinions and theories on how to conduct a risk assessment and what variables to include have been developed. The result of these endeavours might have impressed ancient Greek counterparts, but has simultaneously resulted in a number of contesting views and differing practices in the present. This chapter will further elaborate on the specific theoretical insights to be applied within the confines of this thesis and in the light of which some of the current practices will be assessed. As was mentioned in the introduction, there are two ways this thesis makes use of such a framework. First of all there is the overarching CMO model of evaluation which will be discussed in section one. Second, there are the theoretical insights that underpin the normative framework against which the underlying assumptions found in the five NRAs are assessed. The questions that will be asked for each of the five NRAs in order to conduct this assessment and which have been introduced in section 1.3 are all based on this normative framework. Sections two, three and four will each examine the theory behind one of the three specific points of assessment and, eventually, comparison that together make up this framework. Section two will focus on theoretical insights concerning the adoption of a comprehensive view on risk and security, followed by section three on theories relating to the concept of risk and section four on taking into account citizen behaviour.

2.1 - CMO Model of Evaluation

As mentioned in the introduction of this thesis, the founding fathers of *Realistic Evaluation Theory* and with it the Context-Mechanism-Outcome (CMO) model of evaluation are Ray Pawson and Nicholas Tilley who originally published their ideas in 1997. In this original publication, the authors summarise the core of *Realistic Evaluation* by way of the following proposition: “(...) causal outcomes follow from mechanisms acting in context.” (Pawson & Tilley, 1997, p.58). The CMO model is established on this foundation of Realistic evaluation, stating that differences in context can lead to the triggering of different mechanisms that in turn result in specific outcomes (Tilley, 2000; Pawson, 2002). Put differently, the specific context in which a particular policy intervention takes place has a strong influence on the eventual outcome of that intervention, through its influence on the particular mechanism or set of mechanisms that is activated. Graphically, the CMO model can be depicted as seen in figure 2.1 on the next page.

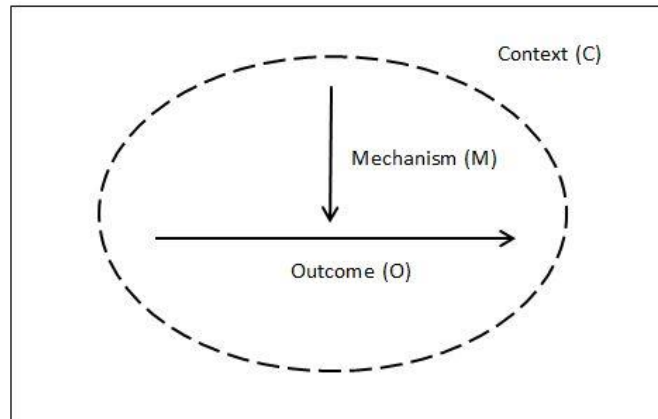


Figure 2.1: The CMO model. Based on Pawson & Tilley, 1997, p.72.

The main components of the CMO model are indeed context, mechanisms and outcome, but how should these ostensibly straightforward elements be defined? Starting with context, Pawson and Tilley state that this element represents the often pre-existing social background into which a specific initiative or programme is introduced and on which the specific set of mechanisms that eventually produce a particular outcome is contingent. Thus, context is the main determinant of which mechanisms concerning a certain policy are triggered. It is important to realise that context is not merely defined in terms of location, be it geographically or institutionally, but that it also includes prevailing social norms, values and relations (Pawson & Tilley, 1997, p.69-70). The second element of the model, mechanisms, can be seen as the choices made by people or groups of people based on their capacities, contingent on the social context they are made in and resulting in a particular outcome. Consequently, each mechanism can in fact be seen as a result of, for instance, social relations and prevailing norms. As argued by Pawson and Tilley, these mechanisms themselves can already be seen as an integral part of the eventual outcome and not merely as a set of self-contained variables. This is a main difference between other theories of causation and evaluation where mechanisms usually only constitute a variable concerning the eventual outcome instead of already being a part of it (Pawson & Tilley, 1997, p.65-69). The final element, outcome, is that which the CMO model tries to explain. An outcome can be summarised as the sum of both context and mechanisms (Pawson & Tilley, 1997, p.71-72). Within this overarching model, three main points of comparison based on relevant theoretical insights have been selected concerning which the activated underlying assumptions in each of the NRAs will be assessed according to the normative framework. The results will be compared to each other. The next three sections will each examine one of these points and the theory behind them. Each of the theories represents a main camp in the debate on the subject discussed in the three points of assessment.

2.2 - A Comprehensive Approach to National Security?

As mentioned above, this section will focus on the theoretical foundations belonging to the first point of assessment which asks whether a NRA has adopted a comprehensive view on risk and security. All of the five NRAs focus on societal risks threatening national security interests. However, in order to determine the risk a particular event could represent, one first has to determine which specific national security interests can potentially be affected, what exactly is at risk. According to the CMO model, every context will lead to different assumptions being activated concerning which national security interests should be included in determining the impact of different risks. These assumptions can have a wide-ranging impact on the outcome of the risk assessment exercise. A single risk is likely to affect a multitude of interests, take for instance a large-scale chemical spill. Next to immediate casualties, there is potential ecological degradation, disruption of daily lives and significant economic costs (ANV, 2016a, p.89). If one is only to consider the impact of this scenario on national security interests related to for instance sovereignty, the eventual impact score will be substantially different from a situation in which one adopts a more comprehensive perspective, also including effects on the environment and the economy. The assumptions made concerning whether or not to adopt a comprehensive approach to defining national security interests can have a large impact on the eventual outcome of the NRA. This is the main reason for including it as a main point of assessment. As none of the five NRAs differentiates between consequences concerning these interests in a rural versus an urban setting, this distinction will also not be featured in this thesis.

Several authors claim that the potentially wide-ranging impact of risks has not always been properly acknowledged by national governments. Since the end of the Cold War and with it the focus on interstate and nuclear conflict, there has been a growing realisation amongst researchers that the notion of national security should encompass a wide variety of different interest and not only those pertaining to territorial integrity, sovereignty and military resilience. In the early 1990s, J. Romm (1993) already advocated for the inclusion of economic and ecological interests in the definition of national security. Several years later, P. Paleri (2008, p.66) went even further by distinguishing no less than 15 different interests that should be included, ranging from cybersecurity to a stable power supply. Chandra and Bhonsle (2015, p.337-339) add to this by stating that a core concept contained within the notion of national security should be the welfare of citizens. These authors all champion a comprehensive view towards risk and security, taking into account a wide diversity of societal interests without differentiating between them in terms of importance. The authors also have in common that they write from the presumption that national governments generally fail to do so, instead focusing

predominantly on matters related to sovereignty. If correct, this statement can be seen as particularly worrying in light of recent developments such as the upcoming phenomenon of hybrid threats. As the name implies, hybrid threats are situations in which a particular entity, be it a state or political action group, uses different tactics simultaneously in order to achieve a specific goal, often at the expense of its peers. These tactics are generally a mix between economic sanctions, cyberattacks and the spreading of misleading information (De Wijk, 2016; NCTV, 2016). When faced with this wide diversity of threats, a comprehensive outlook on risk and security is essential.

As mentioned in the section on methodology in the previous chapter, this thesis will award special attention to whether the subjects of cultural heritage, the stability of the digital environment and ecological stability have been included in particular. There are two main reasons for their inclusion. The first reason can be found in their importance of to society and, especially concerning the latter two, a persisting increase of this importance. Starting with cultural heritage, this subject has been selected as a subject of special attention because it can be seen as an essential part of a society's culture and history, the destruction of which can have a substantial impact, but which, unfortunately, continues to occur, as recent examples from the civil war in Syria have demonstrated (Lenzerini, 2016, p.70-72). The second element, ecological stability, has been selected due to the growing global attention for the causes as well as effects of climate change and the third, final, subject of the stability of the digital environment has been chosen due to the significant, growing threat cybercrime and digital espionage represent (CPB, 2016; NCSC, 2017, p.8-12). Second, the ANV has indicated that these are three specific subjects of which they would like to know more about how European counterparts have approached them. This request originated from the view that there is still room for the NLNRA to improve in relation to their inclusion. Thus, considering these three subjects will add to the societal relevance of this thesis.

Concluding, concerning the first point of assessment, the normative framework calls for a risk assessment to adopt a comprehensive approach towards national security going beyond the notion of sovereignty. Furthermore, all interests need to be included in an equal manner relative to each other. In addition, this research advocates for the inclusion of the three subjects of special interest. The next section will focus on the theoretical foundations concerning the second point of assessment.

2.3 - Approaching the Concept of Risk

The concept of risk is one of the central pillars of a NRA and the way it is approached is of great significance for the findings contained in the document (Aven, 2016, p.4). Consequently, the assumptions that are activated in a specific national context regarding the concept of risk can have a

substantial influence on the final risk assessment product or outcome. This is why the way the concept of risk is approached in each of the five European risk assessments is included as one of the three points of assessment to be considered by this research. More precisely, the second point will assess to what extent the different national risk assessments incorporate elements of a social-constructivist approach to risk. This section will elaborate on the theoretical foundations behind this point of comparison.

Despite of its importance for NRAs, the concept of risk is one that has evaded a common, widely shared definition. In an article on the matter, Tamás Vasvári (2015, p.31-33) identified four different overarching approaches to the concept of risk: economic, psychological, sociological and technical. As, the first approach focusses on the potential benefits of risk taking behaviour and the second one is aimed at individual risk perception and acceptance processes instead of focussing on a more societal level, the latter two approaches are the most applicable to this research on NRAs. The technical approach to risk, sometimes referred to as the classical perspective, defines the concept as the sum of two parts: the probability of some event with negative consequences occurring and the projected impact this event might have (Vasvári, 2015, p.31; Van Asselt en Renn, 2011, p. 436). Put differently, it is the same basic approach to risk as presented in the very first paragraph of this thesis: Risk is probability times impact. An example of this classical perspective is for instance the definition of risk as “probable damage to people, the environment or goods, combined with the size thereof.” (RIVM, 2003, p.19). One of the core foundations of this approach is the proposition that one can in fact objectively determine probability and impact and, consequently, risk. Risk analyses are often of a quantitative, statistical nature using past data to predict future developments. It can be argued that this core foundation and associated methodology is accurate when it comes to small, simple risks such as the ones found in the world of insurance. Based on years’ worth of data and customer information, insurance agencies are for example capable of accurately and quantitatively determining the level of risk associated with a specific policy. However, one can question whether this proposition still holds when applied to the more complex realm of societal risks (Muller, Helsloot & Van Wegberg, 2012, p.70; Vasvári, 2015, p.34).

At this point the second approach to risk, the sociological or social-constructivist perspective, steps in with a fundamental critique concerning the above classical mind-set with respect to risk. To start with, this approach states that it is in fact not possible to objectively determine risk, as the concept is an inherently social construct which can differ depending on context. Two authors that can be seen as belonging to this perspective are Mary Douglas and Aaron Wildavsky. They state that whether or not something is seen as a risk within society is dependent on different social factors. As these social factors, be they norms, principles or relations, differ depending on their context, it is therefore impossible to

produce an objective, universally valid definition of risk (Douglas & Wildavsky, 1983, p.4-8). In other words, risk does not exist as some kind of fixed object, but is instead perceived differently by different people.

Another author belonging to the social-constructivist camp such is Nassim Taleb. He aims his critique on the methods used by classical risk theorists in order to determine both the potential impact and probability related to a certain risk (Taleb, 2007). Whilst a complete reliance on quantitative methods inherently provides little room for the above focus on perception, Taleb adds to this a critique on the lack of reflection on the use of expert assessments and the way they present their results or predictions, especially when these turn out to be incorrect (Taleb, 2007, p.152). Because classical risk theorist often find themselves having to analyse or predict risk outside of the aforementioned world of insurance, there is often a shortage of for instance statistical data on which to base their analysis. Consequently, next to using statistical data or mathematical modelling, there is a high reliance on the use of experts in determining both the probability and impact of more complex, societal risks. Taleb argues that especially when predicting the risk of so-called 'black swan' events, referring to high impact, low probability events, the added value of expert opinion is minimal (Taleb, 2007, p.146-147). Experts and for that matter people in general have often adopted a particular personal or discipline-related perspective and, consequently, may not always consider elements that do not correspond to their own world-view (Taleb, 2007, p.144). In Taleb's book these elements are black swan events, but the problem does not only apply to this specific field as, in general, expert assessment is open to error and bias (Bolger and Wright, 2017, p.230; Taleb, 2007, p.150-157). Even though Taleb (2007, p.150-157) does not reject the use of experts in the production of risk assessment, he does call upon those involved in risk assessment processes to at least be aware of its limitations. One way to avoid bias and include multiple perspectives is to involve experts from different fields, each with an own outlook or to apply a mixed method design, not solely relying on expert analysis.

Summarizing, the social-constructivist approach to risk states that the concept concerns more than a mere quantitative calculation of probability times impact and that one should take into account the subjective aspects of risk. Consequently, any exercise aimed at determining risk that wants to adhere to this perspective should recognise this subjective nature and not solely rely on quantitative methods or scales whilst doing so. Furthermore, social-constructivists state that there needs to be an awareness of methodological limitations when it comes to determining risk. All these dimensions have been included in operationalisation of this second point of assessment as discussed in section 1.3 on methodology. The next section will continue with a discussion on the final point of assessment.

2.4 - Taking Citizen Behaviour into Account

The third point of assessment asks to what extent a NRA has taken into account research on the potential impact of citizen behaviour during and immediately after accidents and disasters. When a risk materialises, it is not always possible for national or local governments and first responders to respond in a timely manner to all those in need. In the case of large scale accidents or emergencies it can often take as much as an hour before emergency services are able to organise themselves and can actually start providing assistance. It is, however, during this first “golden hour” that any relief efforts have the highest potential of saving lives (Helsloot & Ruitenberg, 2004, p.106). As emergency services are not always able to respond in force within this first hour, citizens often have to rely on themselves and their neighbours during as well as immediately after disasters or accidents. This can be on the very short term as is the case with a large scale accident, or on the long term when for instance faced with a blackout lasting for a few days.

According to both Dutch and international research, the often relatively slow response of emergency services and the resulting dependency on citizens for the delivery of first aid and support does not have to be problematic. Citizens often respond both adequately and constructively during the response to accidents and disasters. Furthermore, they do not only look after themselves or their immediate family, but generally also provide assistance to strangers (Scholtens & Groenendaal, 2011, p.21-22; Quarantelli, 1999). Citizens can perform a variety of tasks, ranging from medical first aid to psychosocial support, often staying to help even after professional first responders have arrived (IFV, 2010, p.119-120; Scholtens & Groenendaal, 2011). This degree of self-sufficiency amongst civilians can have a potentially large dampening effect on the eventual impact of materialising risks. However, the same researchers that state citizens behave rationally and constructively during disaster also mention that governments are often unwilling to acknowledge this potential role of their own citizens when creating policies concerning risk management and disaster response (Helsloot & Ruitenberg, 2004, p.103-104; Scholtens & Groenendaal, 2011, p.21-24). This thesis will consider NRAs to be in line with the normative framework in relation to this point of assessment when they in fact have done so. When reading this section, one should be aware that the above research has been mostly based on the behaviour of citizens in the face of more traditional risks such as flooding, large-scale accidents or earthquakes. Thus, they tend to focus on disaster situations or large-scale accidents (Quarantelli, 1999, p.2). The relation between citizen behaviour and other, non-traditional, risks such as for instance cyber espionage or the subversion of society by a foreign power, two scenarios contained in the NLNRA, is unclear.

At first sight, this point of comparison may appear to be somewhat of a second tier element when compared to the previous two, covering fundamental aspects related to NRAs such as scope and the definition of risk itself. However, assumptions activated in the different national contexts concerning this third point can also be seen as having a similar effect on the eventual outcome of a risk assessment exercise. Here, the main effect can be found in the accuracy of the predictions made. As mentioned above, the behaviour of citizens can have a substantial impact on the eventual consequences of a materialising risk. Consequently, different assumptions made concerning the inclusion or not of this factor are of importance for the representativeness of the outcomes contained in the risk assessment and, thus, the utility of the document for policy makers. Moreover, added value can be found in the fact that it, contrary to the previous two points, highlights society itself and its role during times of crisis. The next section will provide a brief conclusion to his chapter.

2.5 - Conclusion

Even though this chapter does not feature its own sub-question, it did focus on two elements that are each essential for answering the main research question of this thesis. Section one focussed on the first element, a further explanation of the CMO model that is to be used as an overarching structure for conducting the evaluation. It described the three main features of the CMO model, context, mechanism and outcome. The pre-existing social norms and principles in each of the countries that produced a national risk assessment will be seen as the context, whilst the specific underlying assumptions that have been activated in order to produce the assessments will take the place of mechanisms in the CMO model. Finally, the outcome is represented by the NRA itself.

The theoretical underpinnings of the three main points of the normative framework on which the different NRAs will be assessed and eventually compared were also discussed. The first point has been based on the call of a number of authors to extend the definition of what is commonly considered as a national security interest beyond the notion of sovereignty or territorial integrity. The second point is grounded in the debate between two competing approaches to the concept of risk: the classical and the social-constructivist approach. The main properties of the latter have predominantly been based on work by Mary Douglas and Aaron Wildavsky as well as by Nassim Taleb. The final point draws on research by, amongst others, Helsloot, Quarantelli and Scholtens which states that citizen behaviour can have a substantial effect on the eventual impact of crises or disasters. This research, however, only covers behaviour in the face of traditional risks. The next chapter will provide a more general introduction to the five NRAs.

3. Main Properties of a National Risk Assessment

Even though underlying assumptions related to the production of a NRA are main determinants of its content, they do not present a complete picture of the document. For example, even though agencies can choose to adopt either a social-constructivist or more classical approach to risk, the way this choice is conveyed to readers as well as the eventual impact it will have depends, at least partially, on some of the main properties of the document in question. These properties can be the way risks are presented in the risk matrix, but also the overall purpose of conducting the NRA in the first place. Preceding the discussion on underlying assumptions in chapters four to eight, this chapter will first address these main properties. It will answer the first sub-question of this research: What are the main properties one can expect to find in a national risk assessment?

The above question will be approached from the perspective of the five NRAs featured in this thesis and the main properties found in each of these documents. The answer to it will be based on these main properties. Before moving on, however, the scope of the discussion needs to be narrowed down substantially. The term main properties is open to a multitude of interpretations. In the case of an NRA, it can range from the type of font used in the document to its location in the national policy cycle. This chapter will focus on four specific elements which, next to underlying assumptions, are essential for the shape, aim and content of a NRA: the main purpose of the document, the structure of the different scenarios used within the documents, the way risks are graphically compared and the relation between national and regional risk assessment initiatives. Sections one to five will discuss how these four elements have been incorporated in the Dutch, Swedish, Norwegian, Swiss and Polish risk assessments, respectively. Section six will provide a summary of results and identify common practices.

3.1 - The Dutch National Risk Assessment

The main purpose of the NLNRA as produced by the ANV, is to help set the agenda for the Dutch government and assist in the identification of priorities concerning matters of national security. In this regard, it can be seen as the precursor to the national capability analysis and part of the SNV. It assists in this agenda-setting and identification of priorities by, amongst other things, compiling a comparative risk matrix which can be seen below in figure 3.1.

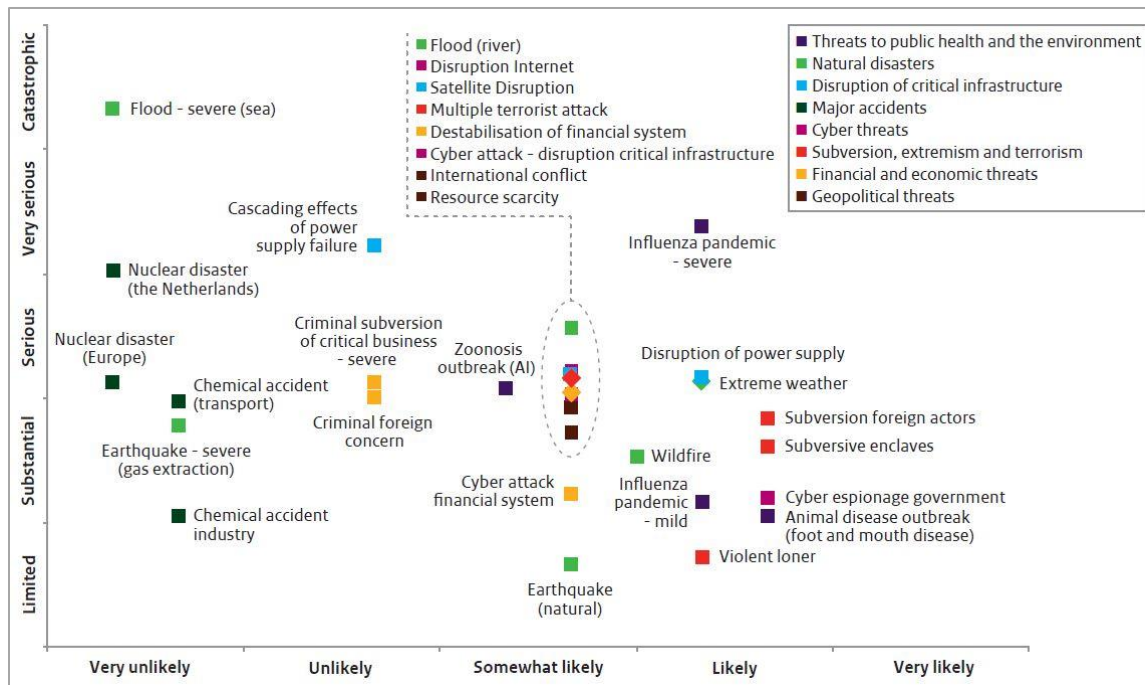


Figure 3.1: Risk Matrix of the NLNRA (ANV, 2016a, p.188)

Each of the different scenarios has been awarded a place along two axes: The X-axis indicates likelihood, ranging from very unlikely to very likely and the Y-axis indicates impact, ranging from limited to catastrophic. Both adhere to a logarithmic scale, meaning that the second impact level is ten times higher than the first (ANV, 2016a, p.187). Each risk category has its own sub-matrix which is identical to the one above, but only contains those scenarios that are related to it (ANV, 2016a, p.175). An important property of the risk matrix is that all scenarios have been awarded specific coordinates. Thus, the choice has been made not to depict the different risks in such a way that it also shows the degree of uncertainty concerning the impact and likelihood of a particular scenario. This can for instance be achieved by showing a bandwidth in the form of a circle surrounding the specific point given to each scenario in the matrix. The larger the circle, the more points in the diagram it can theoretically occupy, the higher the degree of uncertainty. During the interview conducted by the author with a member of the ANV, it was explained that the consortium chose not to adopt a 'bandwidth' depiction because it would reduce the diagram's comprehensibility.

The NLNRA discusses eight different themes ranging from natural disasters to financial-economic threats (ANV, 2016a, p.10-11). These themes have been divided into different risk categories that each contain one or more of the in total 30 scenarios discussed in the document. An overview of scenarios contained in all five NRAs can be found in attachment two. For many risk categories the

NLNRA contains both a worst case scenario and a scenario that can be seen as illustrative of commonly expected events within the specific category. For instance, when looking at flooding and terrorist attacks, the two worst case scenarios are major flooding originating from the sea and multiple simultaneous terrorist attacks. The other two, non-worst case scenarios are the flooding originating from a river and an attack carried out by a violent loner (ANV, 2016a).

Even though only a limited number of scenarios from each risk category are included in the risk matrix, the NLNRA acknowledges the wide variety of possible events by presenting an overview of possible determining factors concerning the impact and likelihood of an event in the form of determining factors for each of the different risk categories (ANV, 2016a, p.28-29). By combining these elements, different scenarios can be constructed despite the fact that only a few are scored and featured in the NRA itself. When looking at the category of extremism and terrorism, determining factors cover areas such as group composition, ideological background and targets (ANV, 2016a, p.149). Based on the specific composition of each scenario, they are scored based on their impact on each of the criteria belonging to five national security interests and awarded a place in the risk matrix. This scoring is conducted in a transparent manner with the impact on each impact criterion being specified and, if needed, elaborated upon. Furthermore, each risk category contains a discussion on background and related historical events and current capabilities. The national interests and their indicators will be discussed in chapter four.

Turning to the relation with regional initiatives, the Netherlands is divided into 25 different safety regions that are not only responsible for responding to crises and disaster, but also for producing regional risk assessments (Ministerie van Binnenlandse Zaken, 2010). Even though this obligation is arranged by law, there are no legal requirements concerning the linkage between these regional initiatives and those on a national level. Nevertheless, a natural division of labour has emerged: The safety regions focus on those risks affecting the local or regional level, such as building collapses or local flooding, whilst the NLNRA directs its attention to those risks that have an impact on the national level, such as terrorist attacks or large-scale flooding. This way duplication is largely avoided, except in those areas where regional and national risks naturally overlap (ANV, 2016a, p.195). Even when there is overlap, the safety regions often tailor the respective scenarios to specific regional circumstances (VGGM, 2016). During the interview it was mentioned that in relation to some topics requiring specialised knowledge such as the digital environment, the ANV can act as a guide for the safety regions. However, it was also stated that it has been challenging to implement initiatives aimed at guiding and

supporting the safety regions and that, in general, the dialogue between the ANV and the respective regional level is limited.

3.2 - The Swedish National Risk Assessment

The Swedish National Risk Assessment (SENRA) has been produced by the Swedish Civil Contingencies Agency (*Myndigheten för Samhällsskydd och Beredskap* or MSB). As stated by the MSB, the main purpose of the SENRA is “[...] to form a strategic basis to further develop civil contingency.” (MSB, 2016a, p.9). Consequently, the SENRA can be seen as assisting in identifying government priorities in the field of national security. The way in which risks the risk comparison is graphically presented differs. The original 2012 risk assessment document contains a risk matrix containing all seven scenarios, as can be seen in figure 3.2 below.

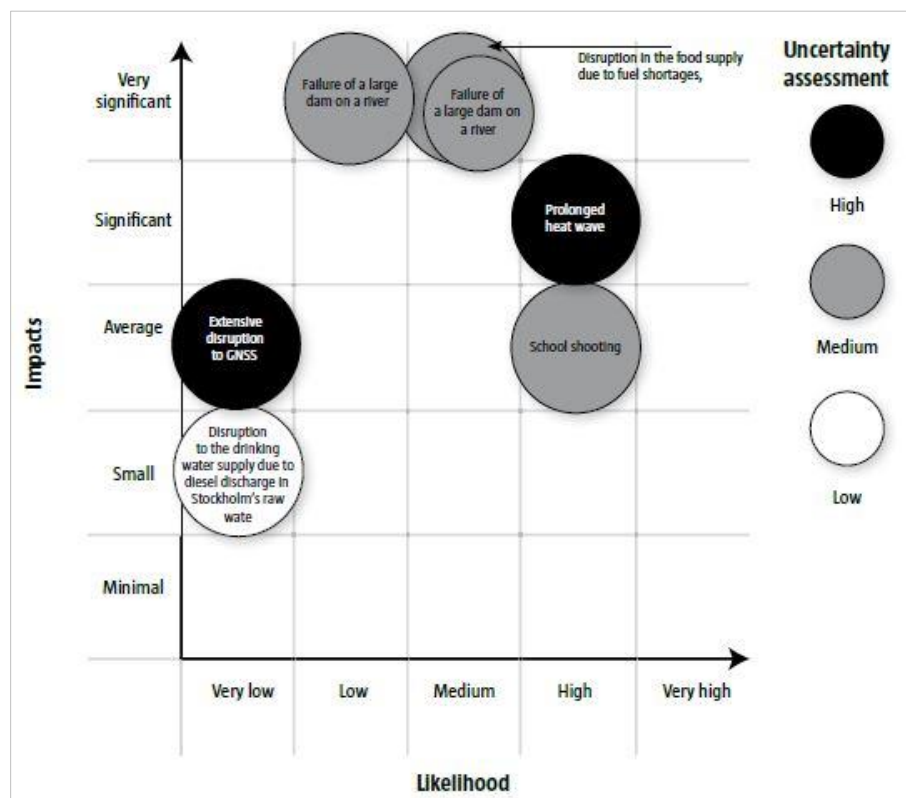


Figure 3.2: Risk Matrix of the 2012 SENRA (MSB, 2012a, p.23)

Risks are awarded a specific location on the basis of both their impact (Y-axis) and likelihood (X-axis). Furthermore, uncertainty levels are depicted in the matrix for each of the scenarios by way of a colour code. In addition, they have been awarded a rather general location instead of a very specific. In the

2016 follow-up document featuring additional scenarios the above matrix has, however, been replaced with a number of comparative tables containing each of the scenarios belonging to a specific risk category, an example of which, featuring a number of antagonistic hazards, can be found in figure 3.3.

Risks	Scenario	Scenario Impact		
		Human	Economy/Environment	Political/Social
Terrorism	Bomb attack	Very serious	Very serious	Very serious
School shooting	School shooting	Substantial	Limited	Serious
Violent disturbances	Violent disturbances	Serious	Substantial	Serious

Figure 3.3: A Risk Table from the SENRA Follow-Up Document (MSB, 2016a, p.23)

When looking at one of these comparative tables above, the observant reader may notice that the uncertainty assessment is no longer depicted and that the impact scales differ from those originally used in the matrix. The revised scales have been drawn from the EU guidelines on risk assessment and also feature a specific score on three impact indicators. Both the indicators and the strong links with EU guidelines will be discussed in chapter five.

Turning to the third element, all 14 scenarios have been placed in one of only four overarching risk themes: natural hazards, major accidents, antagonistic hazards and a disruption to technical infrastructure and supply systems (MSB, 2016a, p.11). For each of the risks featured in the SENRA only a worst probable scenario has been developed. This means that whilst for each of the scenarios considered in the document the expected impact is high, their occurrence is also realistically conceivable (MSB, 2012a, p.31). Each of these worst probable scenarios features a number of components. These are information on historical cases, a summary of relevant stakeholders, a description of the event, an analysis of existing capabilities, an impact assessment, a probability assessment, an uncertainty assessment and, finally, a discussion on capabilities that need to be strengthened.

Looking at the SENRA's relation with regional initiatives, in Sweden all municipalities, counties and national government agencies are required by law to conduct a risk, capability and vulnerability assessment as part of emergency preparedness activities (Lindbom, Tehler & Shoaib, 2014, p.6). There is a relatively large amount of information exchange and reporting between the various levels of government concerning their respective risk assessments. The risk assessments produced by for instance County Councils (provincial administration) rely to a large degree on information provided in

similar municipal initiatives and in turn represent important input for the national risk assessment performed by the MSB (Abrahamsson & Tehler, 2013, p.80; MSB, 2012b, p.33-34). This “comprehensive view” is based on the idea that the different agencies and levels of government can accomplish more together and unnecessary duplication of efforts can be avoided (MSB, 2012b, p.17). In order to facilitate the process, MSB has issued a number of regulations (MSB, 2012a, p.13). The SENRA only contains those “crises in society” that can be considered “national events”, going beyond the county or municipal level. A crisis qualifies for this label if it meets one or more of three conditions: more than 30 fatalities, more than SEK 750 million of damages or severe political or social consequences (MSB, 2012a, p.16-17).

3.3 - The Norwegian National Risk Analysis

In Norway, the National Risk Analysis (NONRA) is produced by the Norwegian Directorate for Civil Protection (*Direktoratet for Samfunnssikkerhet og Beredskap* or DSB). Its main purpose is highlighting the different risks that threaten Norwegian society for the consideration of politicians and policy makers. Whilst it does mention current levels of preparedness, it only highlights any gaps or suggested follow-up related to these capabilities in a handful of scenarios (DSB, 2014).

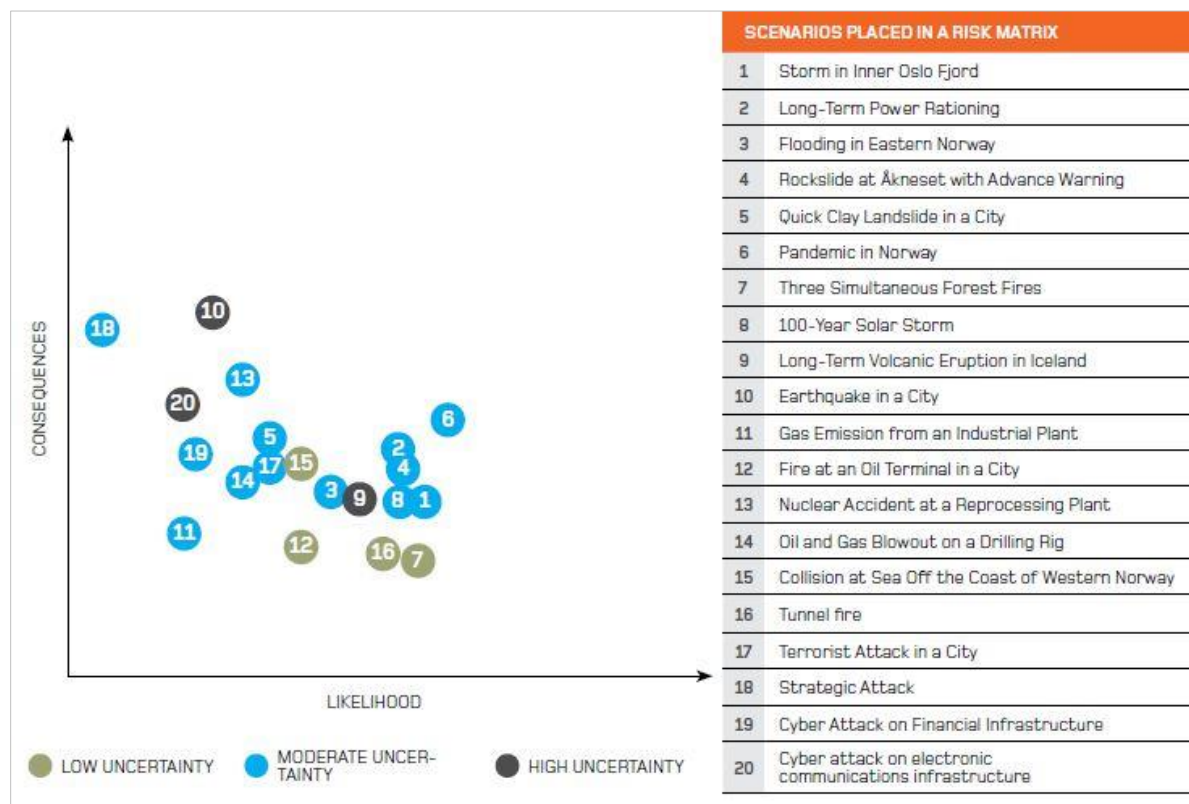


Figure 3.4: Risk Matrix of the NONRA (DSB, 2014, p.207)

Figure 3.4 above showcases the way risk are graphically presented in the NONRA. The matrix assigns a place to each of the discussed scenarios based on their likelihood and consequences, the X- and Y-axes respectively. To some extent resembling the NLNRA, every scenario analysis in the NONRA also contains its own risk matrix, only showing the position of the discussed event (DSB, 2014, p.43). Contrary to the main risk matrix of which the two axes are not explicitly divided into scales, the ones belonging to the individual scenarios contain a five point scale for both impact and consequences. These range from very low to very large concerning consequences and from very small to very high for likelihood (DSB, 2014, p.43). Finally, uncertainty levels are depicted in the matrix itself.

The NONRA contains 20 scenarios that can be seen as having a low likelihood but potentially disastrous consequences for Norwegian society. Here, disastrous refers to the fact that in order to address these events, extraordinary efforts are needed that fall outside of the scope of regular planning and routines (DSB, 2014, p.14). The scenarios are divided over 14 different risk categories, each containing one or two detailed scenarios. These risk categories have in turn been divided into malicious events, natural hazards or major accidents (DSB, 2014, p.2-3). Following a general discussion on background and preparedness for each of the risk categories, all 20 scenarios adhere to a similar structure. When looking at for instance the scenario covering major flooding, it starts with a description of the necessary preconditions in order for the described event to occur. In this case it primarily concerns the amount precipitation and other weather conditions (DSB, 2014, p.48). This is followed by an assessment of the event's likelihood and consequences. This assessment is conducted in a very transparent manner. Each of the scenario descriptions contains an elaborate scoring table in which the consequences of a particular event is scored against each of the impact criteria and additional explanation is provided where needed. The flood scenario for example scores high on its disrupting effects on daily life but medium on the amount of fatalities. The different impact categories will be discussed in detail in section two. Finally, each scenario contains a detailed uncertainty assessment, the results of which are reflected in the risk matrix (DSB, 2014, p.48-51).

Turning to the relation with regional initiatives, the DSB states that the NONRA, by law, should be an important input of risk analyses conducted by both national government agencies as well as authorities at a local level. Municipalities are urged to take the national analysis into account when conducting their own assessment exercise and examine which of the national level risks are also, in one way or another, applicable to their specific situation (DSB, 2014, p.13-15). The DSB has an important role in supporting the different municipalities in doing so (DSB, 2012, p.7). Concluding, providing a common basis for all other risk assessments can be seen as another main purpose of the NONRA.

3.4 - The Swiss National Risk Analysis

When examining the main purpose of the Swiss National Risk Analysis (CHNRA), produced by the Federal Office for Civil Protection (*l'Office Fédéral de la Protection de la Population* or OFPP), one quickly runs into the country's intricate federal system of governance. The country consists of 26 Cantons, each with a high level of autonomy to make decision on matters such as health or education, even when compared to other federal states. It is also the Cantons that hold the primary responsibility for civil protection (Federal Council of Switzerland, 2015). Even though the CHNRA can be seen as an exercise aimed at helping the Swiss federal government to set the agenda on security matters, the decentralised federalism that characterises Swiss politics ensures the federal government's peacetime role in the areas of security and civil protection is of a mostly advisory nature. Only in exceptional circumstances or during times of war does the federal government provide other means of support, subject to the consent of the Canton or Cantons in question (Hegemann & Bossong, 2013, p.9-11). Thus, the CHNRA helps set the agenda for a level of government that can in turn exert very little influence on preparation and response efforts. Next to spillover effects of the CHNRA on the Cantonal level, its effects on security policy will be minimal.

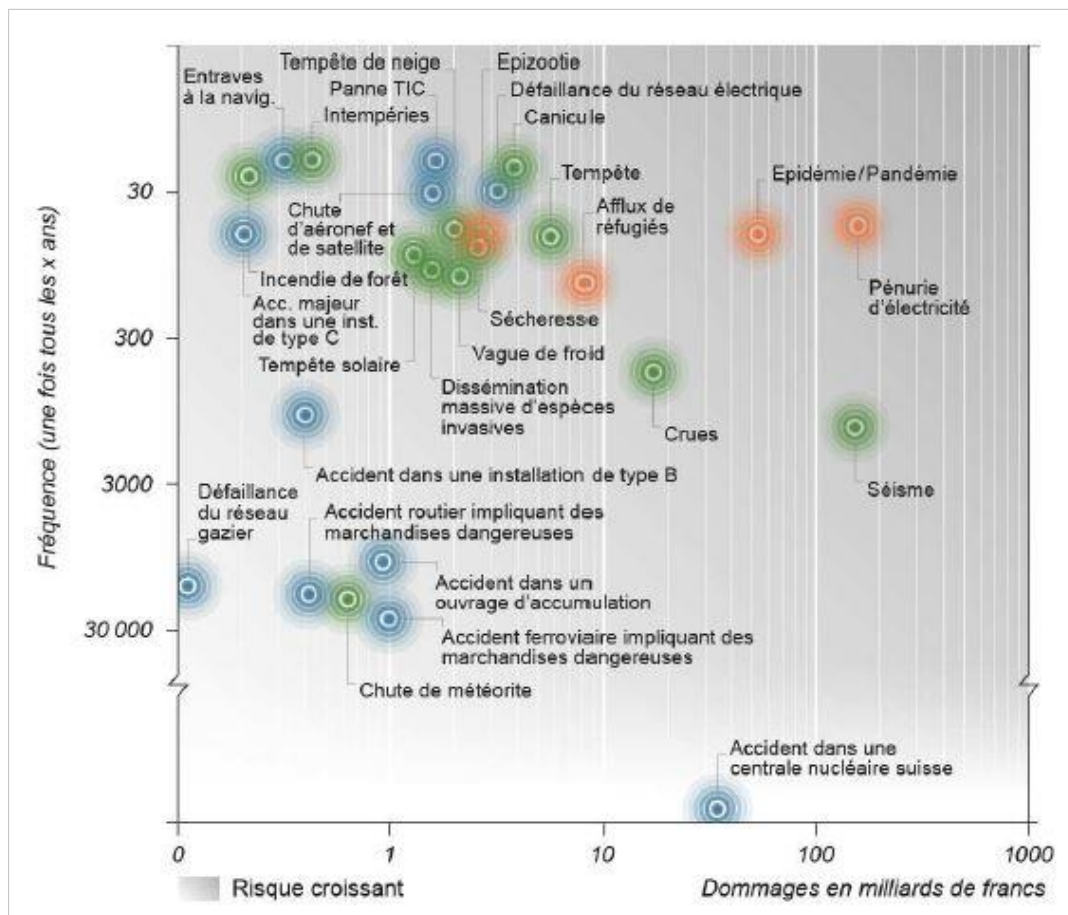


Figure 3.5: Risk Matrix of the CHNRA (OFPP, 2015a, p.22)

The way the different risks are presented in the CHNRA's comparative risk matrix can be seen in figure 3.5 above. It arranges risks according to both their expected frequency of occurrence on the Y-axis and expected damages in CHF on the X-axis. Each risk is awarded a specific place and being colour coded to indicate to which of the three risk categories they belong. The green dots represent risks of a natural origin, the blue ones refer to risks of a technical origin and, finally, the orange points in the matrix represent risks of a social nature (OFPP, 2015a, p.22). Any uncertainties concerning the positioning of the risks are not reflected. A separate matrix is provided for a number of risks of a malicious nature for which it was not possible to determine an expected annual frequency. Here, the Y-axis represents different, less quantitative likelihood levels, from difficult to imagine to relatively plausible (OFPP, 2015a, p.23).

The CHNRA mentions three risk categories: threats of a natural, technical and societal nature. Within these three categories, a total of 33 scenarios have been elaborated in separate documents. The CHNRA itself only mentions the main results of these publicly available analyses (OFPP, 2015a, p.14). Every scenario analysis starts with a general introduction and an overview of historical cases as well as determining factors. Before discussing a particular event at length, three possible versions with varying intensity are introduced. They are of a considerable, major and extreme intensity (OFPP, 2013, p.3). For example, in the scenario document covering a conventional terrorist attack, the 'considerable' scenario is an explosion at a rally with several fatalities, the 'major' version is a bomb on a train resulting in many fatalities and the 'extreme' version represents multiple well-coordinated and simultaneous attacks (OFPP, 2015b, p.5). In order to facilitate the eventual risk comparison the event version with a major level of intensity has been detailed for each scenario (OFPP, 2015a, p.16). This particular event is described in greater detail and both its consequences and likelihood are assessed. However, whilst the former element is discussed at length, any in-depth discussion on the latter is remarkably absent. As a final note, neither the scenario documents nor the overall CHNRA feature a capability analysis. This is most likely because the Cantons are each responsible for their own capabilities.

When examining the relation of the CHNRA with regional or local initiatives, the autonomy of the Cantons again plays a significant part. Holding the primary responsibility for civil protection, the Cantons are also responsible for producing Cantonal risk assessments (Federal Council of Switzerland, 2015). However, due to the high level of independence awarded to each of the cantons, they are free to decide if and in what form they want to do so. As a result, even the legal definition of what constitutes a crisis can vary between the different Cantons (Hegemann and Bossong, 2013, p.7). The CHNRA and the underlying methodology can be used by the cantonal administrations and is available to them, but it is

their prerogative to adopt or reject it (Herzog and Roth, 2015, p. 5). Nonetheless, the majority has opted to adhere to the OFPP methodology (OFPP, 2015a, p.9).

3.5 - The Polish National Risk Assessment

The Polish National Risk Assessment (PLNRA) has been produced by the Polish Government Centre for Security (*Rządowe Centrum Bezpieczeństwa* or RCB). However, as regional agencies have also had a major influence on the composition of the PLNRA, the document's relation with regional or local initiatives will be considered first. The eventual national document is based on fragmentary reports of different government agencies at the national level and, for a large part, on similar reports submitted by the governors of the *voivodships*, administrative entities at a provincial level (RCB, 2015, p.4). These legally mandatory Voivodship reports are themselves based on those coming from their respective municipalities and counties (*gminas* and *poviats*). In turn the results of the national assessment are used as input for the work done by the regional and local authorities in the areas of risk management. This way a continuous cycle of information and feedback exists between the national, regional and local level (Agius, Harrami, Raeva & Bicer, 2016, p.16-18). Consequently, the function of the PLNRA also extends to multiple levels of government. Its main purpose is to assist in keeping the National Crisis Management Plan as well as similar regional initiatives up to date (RCB, 2015, p.3). Furthermore, as for each scenario contained in the PLNRA an indication is given as to whether the threat level is deemed acceptable or not, it is a guide in determining in which areas additional preparatory work should be initiated (RCB, 2015).

Moving to the third main property, the way in which the risk comparison is graphically presented, the risk matrix contained in the PLNRA differs from those featured so far by way of its simplicity. The matrix in question can be seen on the next page in figure 3.6. In the matrix, different risks, here referred to by the numbers one to 11 are awarded a location according to both their likelihood (X-axis) and expected consequences (Y-axis). Whilst this, together with the fact that the matrix does not represent uncertainty levels, is not an uncommon feature when compared to its four counterparts, the above risk matrix does differ from its peers because it explicitly shows risk levels. These overall risk levels are represented by way of the different squares in the matrix and represent the combination of both consequence and likelihood. When a risk is placed in the blue square, the risk level is minimum, in the green squares it is low, in the yellow ones it is medium and, finally, red and brown squares represent large and extreme risk levels (Leduchowska & Pyznar, 2015, p.88; RCB, 2015, p.8).

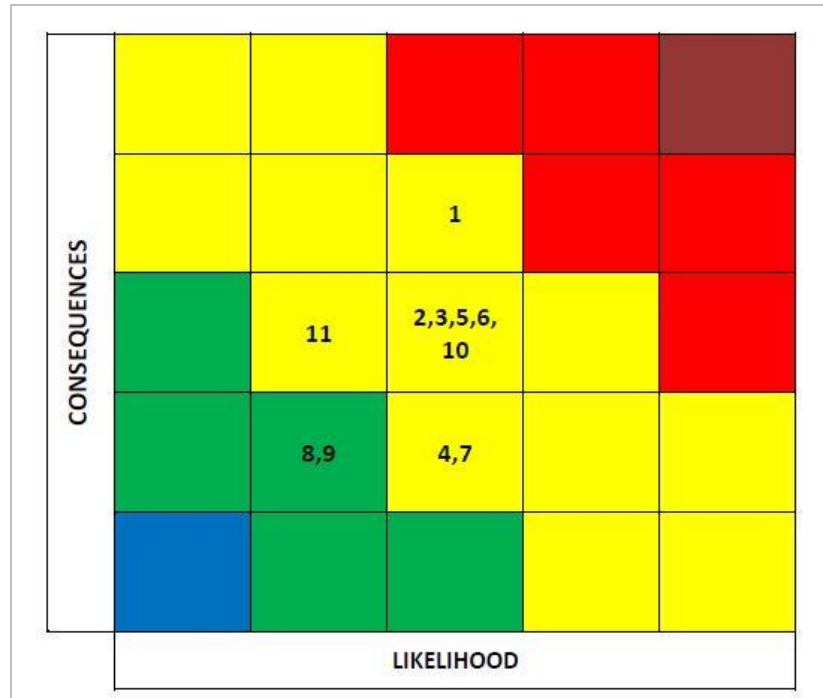


Figure 3.6: Risk Matrix of the PLNRA (RCB, 2015, p.8)

When looking at for instance the NLNRA, similar risk levels can of course be deduced from the position of a specific scenario in the risk matrix, but the PLNRA differs in that it does so explicitly in the matrix itself. Attachment two indicates which scenarios belong to the numbers in the matrix. As a final note, the observant reader may have noticed that contrary to for instance the NLNRA, the CHNRA or the NONRA, all the risks represented in the PLNRA matrix are very unevenly distributed, with no real outliers or even a single risk that scores ‘in the red’. This is probably because the eventual determination of likelihood and consequences is based on an average of the results from the Voivodship reports. Whereas in some the risk of flooding is for instance very high, it can be almost non-existent in others, often resulting in a medium risk level (RCB, 2015, p.17).

Turning to the structure of the scenarios of the PLNRA, it should from the outset be stated that not all of the scenario analyses have been made public, amongst them those covering threats of a political and military nature. Next to these political and military threats, the two other classified threat categories are risks caused by intentional human activities and risks of a terrorist nature which may lead to an emergency (RCB, 2015, p.8). Even for the 11 scenarios that are discussed in the PLNRA only a summary discussion is presented, with the main analysis located in the different fragmentary reports created by the different government agencies and the Voivodships. Nevertheless, the summary discussion does contain some interesting features, amongst which an indication of the geographical spread of different risks. Again taking the example of flooding, the scenarios summary provides not only

an overview of main probable causes and potential locations for the risk to materialise, but also a map showing the geographical spread and variation in the risk level related to flooding. Furthermore and as mentioned in one of the previous paragraphs, the level of risk acceptance is depicted. In the case of flooding, both the responsible ministers and province governors find it to be tolerable (RCB, 2015, p.17). Finally, the main criterion for the inclusion of a scenario is that it can have “a major influence on the functioning and development possibilities of the state (...)” (RCB, 2015, p.6). The final section of this chapter will summarise the discussion and provide an answer to the sub-question.

3.6 - Summary and Conclusion

This chapter started with the following sub-question: *What are the main properties one can expect to find in a national risk assessment?* In order to answer this question, sections one to five have each discussed the main properties of the Dutch, Swedish, Norwegian, Swiss and Polish NRAs. The focus has been on four distinct elements: the main purpose of the document, the structure of the different scenarios used within the documents, the way risks are graphically compared and the relation between national and regional risk assessment initiatives. Based on the results of this discussion, common practices in relation to each of the four elements can now be identified, answering the above sub-question. Figure 3.7 on the next page presents a summary of the discussion. One should keep in mind that this conclusion is only based on five relatively comparable documents.

Concerning the first element, the main purpose of an NRA, the results as shown in the second column of figure 3.7 are clear. One can expect to find that the main purpose of a NRA is to, in some way, assist the national and sometimes regional governments in identifying priorities or creating policy concerning matters of safety and security. Of course, the extent to which a specific NRA has the potential of truly influencing policy decisions will depend on context. For the second element, covering the risk matrix, the results also appear to be relatively similar at heart for each of the five NRAs. Whilst appearances differ, they all depict risks along two axes representing some form of likelihood and consequences, with only the CHNRA explicitly defining the latter in terms of monetary units in the matrix itself. Even those scenarios contained in the SENRA which are placed in comparative tables instead of a risk matrix are awarded a location according to these two dimensions. Consequently, in general one can expect to find that an NRA compares risks along the two axes of likelihood and consequences often by way of a graph.

Countries	Main Purpose	Risk Matrix	Scenario Structure	Relation with Regional Initiatives
The Netherlands	As part of the SNV it helps set the agenda on matters of national security.	Arranges risks according to likelihood and impact. Uncertainty levels are not depicted.	Discusses both a worst case and a more normative version of a scenario type. Also mentions current capabilities.	Limited dialogue. Division of labour between regional and national levels.
Sweden	Help further develop policies surrounding civil contingencies.	Arranges risks according to likelihood and impact, depicting uncertainty levels. However, the majority is placed in comparative tables.	Discusses worst probable scenarios and is the only one to feature an analysis of required additional capabilities.	Extensive exchange of information. Assessments performed on a county and municipal level provide input.
Norway	Highlight risks for the consideration of politicians and support the development of local and regional assessments.	Arranges risks according to likelihood and consequences, depicting uncertainty levels.	Focusses on low likelihood but potentially disastrous events. Also features a relatively extensive uncertainty analysis.	Provides input for other initiatives. Local authorities are expected to look at the NONRA.
Switzerland	Help the federal government set the agenda on security matters. However, it has little powers in this area.	Arranges risks according to expected annual occurrence and monetary damages, not depicting uncertainty levels.	Introduces three levels of intensity for each scenario: considerable, major and extreme.	No formal link. Cantons are free to use the CHNRA or not.
Poland	Assist in keeping the National Crisis Management Plan and similar regional plans up to date.	Arranges risks according to likelihood and consequences, not depicting uncertainty levels.	Indicates whether the risk level is seen as acceptable and shows the geographical spread of the risk.	Extensive dialogue and feedback cycle. Regional reports form the basis of the PLNRA.

Figure 3.7: Main Properties of the Five NRAs

The fourth column in figure 3.7 shows a number of the defining features concerning the scenarios featured in each of the NRAs. Next to these unique features, the scenario structures of all five NRAs

have many comparable elements such as an overview of historical cases, a scenario description, an estimate of potential consequences and projected likelihood. These are the elements one can expect to find. The types of scenario that are investigated differ however. Whereas the NLNRA examines both a worst case and a more normative version of a particular scenario type such as flooding, the CHNRA also mentions a differentiation in intensity as well, but it only fully explores one event. In terms of the relation between national and regional initiatives, the majority of the five NRAs feature relatively strong links between the two. As can be seen in the final column of figure 3.7, the Netherlands and Switzerland are the only two countries where this is not the case. Thus, in general, one can expect to find that an NRA has relatively strong links with regional or even local initiatives. The next chapter represents the first case study on underlying assumptions, focusing on the NLNRA.

4. The Dutch National Risk Assessment

The Netherlands is a country that distinguishes itself from most of its peers by the fact that over a quarter of its territory is located below sea level. Furthermore, due to the many waterways that cross the country such as the Rhine and Meuse rivers, another 29 percent is prone to flooding. (Planbureau voor de Leefomgeving, 2010). In terms of at risk population, the Dutch government's worst case flooding scenario estimates that the homes of as many as one in three people will be affected, equating to more than 5.6 million of its citizens. The majority of these people, 4.2 million, live in the economic heartland of the country, the 'Randstad' area including cities such as Amsterdam, Rotterdam and The Hague (Planbureau voor de Leefomgeving, 2014, p.13). Consequently, it is not surprising that this worst case scenario has the highest impact score of all NLNRA scenarios (ANV, 2016a, p.200-201).

Despite the risks posed by flooding and the amount of resources aimed at preventing its occurrence, the NLNRA does not confine itself to the topic. It adopts an all-hazard approach, implying that it analyses natural hazards, hazards caused by technical failures as well as threats due to malicious intent (ANV, 2016a). This chapter will in turn analyse and assess the underlying assumptions found in the NLNRA, answering the following question based on the second sub-question of this research: *What are the main underlying assumptions found in the NLNRA with respect to the three points on which it will be examined and to what extent do these assumptions align with the normative framework?* When approaching this chapter from the overarching CMO framework, it examines what assumptions have been activated in the Dutch national context concerning three specific points, resulting in the current NRA. Section one will focus on the extent to which the NLNRA has adopted a comprehensive approach to national security, section two on the concept of risk and section three will analyse whether citizen behaviour has been taken into account. Finally, section four presents an answer to the above sub-question. This chapter has been based on a document analysis of the 2016 NLNRA (ANV, 2016a), a set of accompanying guidelines for determining impact categories published (ANV, 2016b) as well as a number of predecessors to the current NLNRA (ANV, 2011; ANV, 2014, p.88; Ministerie van Binnenlandse Zaken, 2008). Furthermore, the author has conducted an interview with one of the key figures involved in the production of various NLNRAs.

4.1 - Five National Security Interests: A Comprehensive Approach?

Sovereignty and with it the notion of territorial integrity are elements that according to a number of authors (Romm, 1993; Paleri, 2008, p.66; Chandra & Bonsle, 2015, p.337-339) take precedent over

others when countries define their national security interests or, in the case of this research, the subjects that are threatened by different risks. As seen in chapter two on the theoretical framework, these authors state that countries often fail to adopt a more comprehensive view on societal interests and national security and in turn advocate for the adoption of a more comprehensive view. This section will assess whether the NLNRA adheres to this call or normative framework by asking if other interests than sovereignty and with it the notion of territorial integrity have been taken into account and whether these have been included in an equal manner. Special attention will be paid to whether the subjects of the stability of the digital environment, cultural heritage and ecological stability have been included.

In the discussion on the NLNRA in chapter three there has been mention of five national security interests that are contained in the document. In order to operationalise them, a number of impact criteria have also been developed against which the different risks will be scored. These interests and indicators can be seen in figure 4.1 below.

National Interest	Impact Criteria
Territorial security	1.1 - Encroachment on the territory and digital environment 1.2 – Infringement of the international position of the Netherlands
Physical safety	2.1 - Fatalities 2.2 - Seriously injured and chronically ill people 2.3 - Lack of basic necessities (physical suffering)
Economic security	3.1 - Costs 3.2 - Violation of the vitality of the Dutch economy
Ecological security	4.1 - Long-term violation of nature (flora and fauna) and the environment
Social and political stability	5.1 - Disruption of daily life 5.2 - Violation of the democratic constitutional state (“ <i>Rechtsstaat</i> ”) 5.3 - Societal impact

Figure 4.1: National Interests and Impact Criteria in the NLNRA (ANV, 2016a, p.31)

A first glance at the above table already indicates that interests other than sovereignty and territorial integrity have in fact been taken into account. When adhering to the definition of sovereignty as presented in chapter two, only a limited number of impact criteria, notably 1.1 and 5.2, can be seen as closely related. Thus, since both interests and subsequent criteria relating to for instance physical safety of citizens and the functioning of the economy have been included, it can be stated that other interests than sovereignty have been considered.

However, the question of the extent to which each interest has been equally incorporated still remains. Whilst not explicitly discussed in the NRA document, it was mentioned in the interview conducted by the author that the impact scores attributed to the different individual criteria each have the same influence on determining the overall impact score and the position of the scenario at hand in the risk matrix. Thus, the societal impact of for instance an attack by a lone wolf will have the same influence on overall impact as the number of fatalities. Even though previous editions have experimented with assigning different values to each of the criteria based on four different types of world view found within Dutch society, with some people attributing a higher value to the environment and others to the functioning of the free market, this has not been incorporated in the NRA (Ministerie van Binnenlandse Zaken, 2008, p.89-98; ANV, 2014, p.88). Consequently, at indicator level all elements are considered to be equal.

When looking at the level of the different national interests, one can still question whether the national interest of ecological security, which features only one impact criterion, is awarded the same standing in determining the overall impact level of a particular risk as the other national interests, featuring two or even three criteria. When looking at the scores attributed to the environmental impact criterion it appears to play a relatively small role in the document. Out of the 30 scenarios, only eight mention that environmental consequences are to be expected. In comparison, consequences concerning one of the criteria related to the national interests of territorial security and social and political stability are applicable in 24 and 30 scenarios respectively (ANV, 2016a). Of course this is partly due to the scenarios that were selected to be included in the NRA document. One can for instance hardly expect serious environmental consequences resulting from the lone wolf scenario as it is currently detailed in the NLNRA. However, with only one criterion that can result in the inclusion of ecological interests in defining the impact scores of the different scenarios, its chances of influencing the overall impact score appear to be structurally smaller.

Whilst the subject of ecological stability has at least been included, this is not the case when it comes to cultural heritage. It is only mentioned in a footnote in the NLNRA document, which merely states its possible inclusion has been discussed (ANV, 2016a, p.30). Furthermore, it is not featured in the accompanying guidelines for impact determination (ANV, 2016b). During the interview it was however mentioned that the ANV has discussed the topic and that it is currently examining how it can possibly be included as a separate criterion in future versions of the NRA. Nevertheless, it remains challenging to objectively determine the value of cultural heritage without resulting to expressing it in monetary terms, as these costs are in fact already included in criterion 3.1. The final subject to be

considered, the stability of the digital environment, has been awarded a place in impact criterion 1.1. However, despite of its explicit inclusion, there is no in-depth analysis of it in the current version of the NRA. At this point the sub criterion has been defined, but guidelines on how and on what basis impact should be determined are currently still under development. Consequently, whilst it is mentioned in the documents, it does not yet affect impact scores (ANV, 2016b).

Concluding, as other interests than sovereignty and territorial integrity have been considered, the NLNRA has adopted a comprehensive approach and, in this regard, is in line with the normative framework. However, the subjects of the stability of the digital environment and cultural heritage are not included as separate impact area. Furthermore, whether or not ecological security has been taken into account in a manner equal to the other national interests in the document remains subject to debate. The next section will discuss the way risk is approached

4.2 - Approaching Risk in the Netherlands

The social-constructivist approach to risk presents a clear departure from the discourse of objective calculation contained in those perspectives that can be defined as technical or classical and has been adopted as the basis of the normative framework on the way the concept of risk is approached. This section will analyse to what extent the NLNRA adheres to this perspective on risk, as described in chapter two. It focusses on three distinct elements. First of all, it will examine how the concept of risk is defined and whether subjective elements related to the general concept are acknowledged, followed by a discussion on what methods are used to determine it and how methodological limitations are addressed. Finally, it will analyse what scales are used in order to help determine the impact and likelihood category of a risk and whether these are predominantly qualitative or quantitative.

Starting with the first element, the NLNRA mentions that it aims to avoid a more traditional definition of risk, circumventing the classical approach of risk as probability times impact. Risk is defined as the “interplay between impact and likelihood”, with impact referring to the grand total of consequences and likelihood to “expectations concerning the occurrence of a disaster or crisis or the development of a threat.” (ANV, 2016a, p.27). In addition, the NLNRA explicitly acknowledges two distinct dimensions related to the concept of risk. On the one hand, it is argued that risk can be seen as a possible subject of objective calculation. On the other hand, the NRA states that risk can also be seen as a social construct that is influenced by perception and previous experiences. At first sight, the definition adopted by the NLNRA and the explicit recognition of the subjective dimension to risk appears to be in line with social-constructivist theory, acknowledging that risk concerns more than a mere quantitative

calculation of probability times impact and taking into account societal perception. During the interview it was said that even though it is relatively difficult to incorporate some of the insights drawn from social-constructivism, a serious attempt was made. Most importantly, a few criteria have been defined in a very qualitative manner. An example is criterion 5.3 (see figure 4.1). Here, impact is for a large part determined based on perception (ANV, 2016b, p.26-27).

The methods used in the NLNRA in order to assess risk, taking into account its two key dimensions, are manifold. Risk assessments are not only based on historical data and analytical, probabilistic, models, but also to a large extent on expert opinions and consultation sessions (ANV, 2016a, p.28). However, as discussed in chapter two, both expert opinions and probabilistic modelling have their drawbacks seen from a social-constructivist perspective. How are these limitations addressed? First of all, the ANV has made use of different approaches drawn from various disciplines when composing the NRA. By applying a mixed-method approach, each method can compensate for the limitations of another, resulting in a well-balanced final product. Second and concerning expert assessments, a special protocol has been established in order to ensure that the process is transparent and different perspectives are taken into account (ANV, 2016a, p.28; ANV, 2016b, p.52-53).

The final aim of both the expert assessments and probabilistic modelling is awarding every scenario a specific location in the overall risk matrix. Whether predominantly quantitative or qualitative scales are used in defining the impact and likelihood categories aimed at scoring the different scenarios provides an indication of to what extent a social-constructivist perspective has been adopted. Starting with likelihood, the occurrence of each of the risks contained in the NRA is either very unlikely, unlikely, somewhat likely, likely or very likely. The basis upon which this classification is awarded can however differ depending on whether the risk at hand can be seen as malicious or non-malicious. In the case of the latter, the probability category is often determined on the basis of historical frequency, whilst in the case of the former this is done on the basis of expert opinions. (ANV, 2016a, p.31). Consequently, in the case of non-malicious threats, such as major flooding, a probabilistic scale is used. Here, the risk is seen as very unlikely when chances of it occurring in the next five years are less than 0,05 percent, or as very likely when more than 50 percent (ANV, 2016a, p.31). On the contrary, when looking at a malicious threat such as a terrorist attack, a qualitative scale is applied reflecting the nature of expert assessments. Here, a risk is very likely when there is concrete evidence for its occurrence within a timespan of five years. Concerning impact, the categories are: limited, substantial, severe, very severe or catastrophic. The specific impact category that is awarded to each risk depends on the score it received on the different impact criteria related to the five national security interests. If there is an expected

impact in relation to a specific indicator, it is awarded a classification ranging from A to E with the latter representing the highest possible impact score (ANV, 2016b, 45-47). The overall impact is based on the average score on these criteria. As these criteria can be either quantitatively or qualitatively defined, the basis upon which an overall impact category is awarded can be seen as a mix between the two approaches.

This section has shown that the NLNRA adheres to the social-constructivist perspective on risk to a large extent. It acknowledges the subjective elements related to risk and, furthermore, uses a wide variety of methods to determine it. By adopting this mixed-methods design, it is aware of and addresses the methodological limitations of individual approaches. Finally, a mix between both qualitative and quantitative scales is used in order to determining impact and likelihood of a specific scenario in the overall risk matrix. However, as the NLNRA still states that it is also possible to approach risk objectively, it is not possible to regard it as having adopted a fully social-constructivist perspective. The next section will focus on citizens and the NLNRA.

4.3 - Citizen Behaviour and the NLNRA

The Dutch government is increasingly relying on the active participation and agency of its citizens when it comes to for instance care for the elderly and social support programmes. Here, the government aims to step down as the primary actor and expects citizens to assume more responsibilities (Ministerie van Binnenlandse Zaken, 2013). This section will analyse whether the Dutch government also acknowledges the effect of the behaviour of its citizens during crises or disaster in the NLNRA. It will examine to what extent the document is in line with the normative framework, stating that governments should do so.

The first question to be asked here is whether the NLNRA acknowledges citizen agency. Following the analysis, it can be said that the potential role of citizens and its effect on the impact of different risks is not explicitly recognised anywhere in the NLNRA document. In the scenario discussions, citizens are predominantly regarded as relatively passive subjects in need of assistance. An example can be found when looking at both the risk category and scenario covering major flooding. All of the described capabilities highlighted within the overarching risk category relate to government initiatives, with no mention on levels of (un)preparedness amongst citizens or their potential role in supporting government initiatives (ANV, 2016a, p.39-40). Furthermore, within the actual analysis of the major flooding scenario, citizens are only referred to in the capacity of expected casualties or evacuees (ANV, 2016a, p.41-44). This is despite the fact that previous instances of flooding in the Netherlands have shown that there is a high degree of citizen self-sufficiency. In 1995, flooding in the *Rivierenland* region

threatened many tens of thousands people that in turn had to leave the area. During the evacuation, citizens showed a high degree of self-sufficiency instead of depending on government agencies (Helsloot & Van 't Padje, 2010, p.25-26; Tweede Kamer, 1996, p.4). Also in relation to a more recent crisis, the high water levels in *Ten Boer* in 2013, a follow-up survey conducted amongst citizens has shown that a large amount of them assisted in containing the crisis or provided support to their neighbours (Crisislab, 2013, p.26-27).

During the interview it was mentioned that the effects of citizen behaviour have sometimes been incorporated in the assessment via the data that is used in order to determine potential consequences. Returning to the scenario of major flooding, the consequence assessment is predominantly based on data from historical events such as the amount of victims and economic damages. In this historical data, the effects of citizen behaviour are already included in the victim and damage count, be it in a very implicit manner. Whilst this covers scenarios for which historical data is in fact available, previous sections have shown that the risk analyses contained in the NLNRA are to a large extent also based on expert opinions and consultation meetings. During the interview, no mention was made as to if or how the subject of citizen behaviour has been approached during these sessions. Naturally, for a number of scenarios that were discussed during these expert meetings, the inclusion or not of citizen behaviour will not have an effect on the overall scores. In the case of a major malfunction in the global network of satellites, it is for instance very improbable for citizen behaviour to have a substantial impact. One can also imagine that factors such as whether people live in urban or rural areas and whether the populous has a large sense of community or not are possible determinants for the potential of citizen behaviour to have a mitigating impact on the consequences of a crisis. Nonetheless, judging from the general lack of attention for citizen behaviour in the document, it is unlikely that the mitigating effects of citizen behaviour and the above considerations related to determining them have been a major point of discussion during the analysis of those scenarios where it could play a potentially significant role.

Summarizing, the ANV has only to a very limited extent included the potential effect of citizen behaviour when determining the impact of various risk. This has been achieved in a relatively implicit manner through the use of historical data. The effect is, however, not explicitly defined for any of the scenarios contained in the NRA and citizens are still approached as being more or less passive subjects deprived of agency. Based on this, it is unlikely that citizen behaviour has been extensively considered concerning those risks that do not rely on statistical data for their assessment. Thus, in this regard the

NLNRA is not in line with the normative framework. The next section will provide an answer to the sub-question of this chapter.

4.4 - Conclusion

This chapter started by asking the following question: *What are the main underlying assumptions found in the NLNRA with respect to the three points on which it will be examined and to what extent do these assumptions align with the normative framework?* Following the discussion in the previous three sections, the different parts of this question can now be answered. This will be done by looking at the results of the discussion for each of the three points of analysis individually.

Section 4.1 started with the question of whether a comprehensive approach towards national security has been adopted by the NLNRA. It was concluded that in this regard, the underlying assumptions align with the normative framework to the extent that a comprehensive approach has indeed been adopted. However, the subjects of the stability of the digital environment and the protection of cultural heritage were not explicitly considered as separate impact areas that could be affected in their own right. Furthermore, it is debatable whether the subject of ecological stability has been included in a manner equal to the other four national interests, looking at the number of indicators. Section 4.2 discussed the way the NRA approaches the concept of risk and whether this is in accordance with a social-constructivist perspective. It concluded that, the NRA adheres to the social-constructivist perspective and thus to the normative framework adopted by this thesis to a large extent. It acknowledges the subjective elements related to risk in its definition of the term, uses a wide variety of methods to determine it and addresses their methodological limitations. The NLNRA also uses both qualitative and quantitative scales in order to determine the impact and likelihood of a risk. However, as it states risk can also be approached objectively, it cannot yet be seen as fully social-constructivist. Finally, Section 4.3 analysed the degree to which the NRA takes the role of citizens into account. It concluded that the ANV has to a very limited extent included the potential effect of citizen behaviour, be it in a mostly implicit manner through the use of historical data. The effect is however not explicitly defined for any of the scenarios and citizens are mostly presented as being passive subjects deprived of agency. Consequently, in this regard the NLNRA is not in line with the normative framework. The next chapter will focus on the first European counterpart of the NLNRA: the Swedish national risk assessment.

5. The Swedish National Risk Assessment

Prolonged heat waves, disruptions in the food supply and the failure of a large dam may not be three topics that immediately spring to mind when thinking of Sweden. Whereas most of us will probably tend to associate the country with sturdy flat-pack furniture, Midsummer or the Northern Lights, the Swedish Civil Contingencies Agency (MSB) concerns itself with the three aforementioned risks and others like it that may threaten Swedish society. The SENRA was produced in 2012 and contains seven detailed scenarios (MSB, 2012a). Following the production of the initial document and methodology, a further seven scenarios have been analysed (MSB, 2016a, p.7). Both the original SENRA as well as the addition will be considered in this analysis of underlying assumptions. The following question will be addressed, based on the second sub-question of this thesis: What are the main underlying assumptions found in the SENRA with respect to the three points on which it will be examined and to what extent do these assumptions align with the normative framework? This chapter represents the first analysis and assessment of underlying assumptions found in a European counterpart of the NLNRA. The results will be used as a comparison for those of the NLNRA and may serve as a potential source of recommendations for the next version of the Dutch initiative. When translating the function of this chapter to the overarching CMO framework, it can be seen as examining the extent to which the Swedish national context may have led to different underlying assumptions being activated concerning the creation of a NRA.

In order to answer the above question, this chapter will follow a structure similar to that of the previous one. Section one will focus on whether the SENRA features a comprehensive approach to national security and section two will discuss to what extent a social-constructivist approach to risk has been adopted. Section three will analyse whether citizen behaviour has been taken into account by the Swedish government. The final section will provide an answer to the above question. The analysis is based on a document review of a number of MSB publications: The 2012 SENRA (MSB, 2012); the 2016 follow-up document containing additional scenarios (MSB, 2016); a guide to risk and vulnerability analysis (MSB, 2012b); a guide to scenario analyses (MSB, 2016b) and a document covering risk identification (MSB, 2011). In addition, two other, non-MSB publications have been consulted: An article on national risk assessments by Bossong and Hegemann (2016) and an analysis of national risk regimes in Norway, Sweden and Iceland focusing on the Role of Citizens by Throne-Holst, Slette-meås, Kvarnlöf and Tómmason (2015).

Before starting with the analysis, an important feature of the SENRA needs to be addressed: its strong links with related EU guidelines and initiatives. The methodology used in compiling the SENRA has for a large part been based on guidelines produced by the EU (MSB, 2012a, p.15; European commission, 2010). Furthermore, a driving force behind the establishment of a national risk assessment cycle in Sweden can be found in an EU initiative on the matter, an initiative which in most European countries has not been met with large enthusiasm or commitment (Bossong and Hegemann, 2016, p.233; Council of the European Union, 2011; MSB, 2011, p.9). These strong links will manifest themselves occasionally in this chapter, as they have done in the discussion on the main properties of the SENRA in chapter three. Of course, as the Dutch practice of producing risk assessments predates this EU initiative, these initiatives, by default, could not have had a similar influence on the original development of the Dutch methodology.

5.1 - A comprehensive Approach to National Security?

As concluded in the previous chapter, the NLNRA has adopted a comprehensive approach to national security by including interests other than sovereignty and with it territorial integrity. This section will investigate if this is also the case for the SENRA and whether the different interests have been included in an equal manner in order to assess to what extent the Swedish initiative is in line with the normative framework of this thesis. It will start with a more general examination, followed by an analysis on whether the specific subjects of the stability of the digital environment, cultural heritage and ecological stability have been included.

The SENRA scores the impact of the different scenarios on the five Swedish national values of protection, each of which has its own set of indicators in order to facilitate the impact determination process. Both the values of protection and the related indicators can be seen in figure 5.1 on the next page. Whilst these values form the basis of the impact assessments contained in the original 2012 assessment and the most recent follow-up document, they have been translated into the three impact categories found in the EU guidelines on conducting a national risk assessment as was briefly mentioned in the section on main properties of the SENRA in chapter three: human; economic/environmental and political/social impact (MSB, 2016a, p.10).

National Values of Protection	Indicators
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 & support functions 1.9 - Protection, safety and security 1.10 - Social security 1.11 - Transport
Human life and health	2.1 - Inadequate fulfilment of basic needs 2.2 - Number of fatalities 2.3 - Number of severely injured/ill 2.4 - Number of persons requiring evacuation
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
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
National sovereignty	5.1 - Violation of national sovereignty 5.2 - Domestic order and security issues

Figure 5.1: National Values of Protection and Indicators in the SENRA (MSB, 2016a, p.15)

From the above table one can already conclude that the Swedish risk assessment has indeed taken other interests than those related to for instance national sovereignty into account. In fact and especially when looking at the list of indicators, a wide range of different potential impact areas has been considered by the MSB in the production of the SENRA. Figure 5.2 shows the way the Swedish values of protection have been translated to the EU impact categories. The question remains as to what extent each of the national protection values are considered in an equal manner when determining overall impact? When looking at the way the 14 scenarios are compared to each other in the follow-up document (see figure 3.3), a defining feature is the fact that impact is not determined on an aggregate level, but only per impact category.

Swedish National Protection Values	Similarity/Difference	Impact Category in EU Guidelines
Human life and health	Similar to:	Human
Economy and environment	Similar to:	Economy/environment
Democracy, rule of law and human rights and freedoms	Covered partially by:	Political/social impact
National sovereignty	Covered partially by:	
Society's functionality	Affects:	All three categories

Figure 5.2: Conversion Table for National Values of Protection (MSB, 2016a, p.10)

This way, any judgement on which protection value should take precedence is left out of the risk assessment and put in the hands of politicians and policy makers. However, some of the values of protection feature considerably more indicators than others. Thus, as is the case with the NLNRA, some of the impact categories may have a structural advantage over others when it comes to being seen as applicable in a specific event. When featuring 11 indicators the chances of one of them being seen as relevant, leading to the inclusion of the overarching category are higher than when featuring only two. Naturally, this reasoning only applies when each of the indicators can be seen as roughly equal in terms of scope, but in general this appears to be the case in the SENRA.

The final question to be addressed here is whether the subjects of the digital environment, cultural heritage and environmental stability have also been taken into account. Starting with cultural heritage, one can state that it has in fact been included in the SENRA. Cultural heritage is part of the protection value related to economy and the environment, specifically indicators 3.1 and 3.3 (MSB, 2012a, p.28). The impact of an event on cultural heritage is expressed in a monetary value and has for instance been included in the scenario describing a major dam failure and subsequent flooding (MSB, 2012a, p.24; MSB, 2016a, p.80). Even though the SENRA does not specify which cost will be taken into account when considering damage to cultural heritage, it is relatively safe to assume that this will be done in line with EU standards given the strong links between the two initiatives. These standards focus predominantly on restoration costs (European Commission, 2010, p.11). As can already be inferred from the name of the protection value covering cultural heritage, it also concerns itself with environmental stability. Stability of the digital environment, has also been included in indicator 1.5. However, a reservation has to be stated concerning the inclusion of these three subjects. Despite the fact that a number of indicators one these subjects have been included have been included, this limited number of indicators will represent only a very small portion of the eventual impact assessment.

Concluding, it can be stated that the SENRA has adopted a comprehensive approach to defining national security interests, also including the subjects of ecological stability, the digital environment and cultural heritage. To this extent, the SENRA is in line with this thesis' normative framework. However, even though the scores on none of the national protection values are prioritised in determining overall impact, the fact that there are large differentiations in the amount of indicators awarded to them may result in some values getting scored more frequently than others. Furthermore, the three aforementioned subjects represent only a small part of the entire impact analysis. The next section will continue with the second main point.

5.2 - Approaching Risk in Sweden

This section will examine to what extent the SENRA has adopted a social-constructivist approach to risk and, consequently, can be seen as being in line with the normative framework. It will focus on three elements: the way risk is defined in the SENRA and whether the subjective nature of the concept is acknowledged will be discussed, the methods used to determine risk together with the way methodological limitations are addressed and, finally, what scales are used in defining the impact and likelihood category of a specific scenario.

The SENRA defines risks as the “weighing together of the likelihood that an incident will occur and the (negative) impacts that this could conceivably have.” (MSB, 2012a, p.17). Whilst this definition is in line with EU guidelines and, by referring to likelihood instead of the more statistical term of probability, to some extent moves away from the strict classical definition of impact times probability, it does not explicitly acknowledge the more subjective elements to risk. Neither in the original 2012 risk assessment document or in the 2016 follow-up document is there any mention of a more subjective approach to the definition of risk or any of the elements such as perception that can be seen as belonging to it (MSB, 2012a; MSB, 2016a). Consequently, despite the promising definition of the term provided by the SENRA from the point of view of a social-constructivist perspective, the MSB has not operationalized it. Thus, concerning this first item, the SENRA can still be seen as de facto adhering to a more classical approach to risk. However, when it comes to assessing both impact and likelihood, it makes use of methods that to some extent depart from this more classical approach. The Swedish initiative relies on a mix of both qualitative and quantitative methods (Bossong and Hegemann, 2016, p.233). For the compilation of the SENRA, the MSB relied heavily on the use of stakeholder workshops (MSB, 2012a, p.32-33). During these workshops, the available data concerning each scenario was used as discussion basis after which the eventual impact and likelihood would be further defined using

stakeholder knowledge (MSB, 2012a, p.33). Thus, quantitative data is used as the basis of a qualitative analysis and discussion. By way of this mixed-method approach, methodological limitations of both quantitative analysis and reliance on expert opinions are addressed. Furthermore, in order to continually refine the workshop methodology as well as address any flaws or limitations, MSB conducts surveys amongst participants asking about their satisfaction with the overall process, its utility and whether additional stakeholders should have been included (MSB, 2012a, p.34).

Following the workshop discussions, the different risks are awarded specific categories concerning both likelihood and impact. For the seven scenarios contained in the 2012 risk assessment a subsequent position in the risk comparison is determined. Risks are classified according to predominantly quantitative scales which are then translated into different categories in either the risk diagram in the 2012 or risk tables in the 2016 document. Impact ranges from limited to catastrophic and likelihood from low to very high, with the latter being based on expected annual probability (MSB, 2012a, p.23; MSB, 2016a, p.12-14). Concerning impact, only impacts that according to the EU guidelines belong to the political/social impact category are scored based on qualitative criteria instead. Regarding the other two impact categories, a classification is awarded on the basis of numerical values such as the estimated amount of fatalities or economic costs in millions of Kronor (MSB, 2012a, p.23-24).

This section has argued that the SENRA has only adopted a social-constructivist approach to risk to a limited extent. On the one hand, qualitative elements have been included through the adoption of mixed-method design and through the use of qualitative scales when assessing social/political impact of a particular risk. This mixed-method design together with the feedback process related to the workshop approach ensure that methodological limitations have been addressed. However, on the other hand the SENRA fails to de facto acknowledge subjective elements related to the general concept of risk and only applies quantitative scales to a limited number of indicators. Section three will discuss the final main point of assessment.

5.3 - Citizen Behaviour and the SENRA

The final point to be discussed concerning the SENRA is the extent to which the potential impact of citizen behaviour has been taken into account when determining the impact of the risks included in the assessment document. Consequently, it will assess whether the SENRA is in line with the normative framework of this thesis concerning this particular point.

To start with, Swedish citizens irrespective of whether they live in densely populated areas or at an isolated location in the countryside are expected to prepare for possible disasters or crises, notify

the responsible authorities of their occurrence and take responsibility by providing assistance if needed (Throne-Holst et al., 2015, p.56-59). Citizens, provided they have the financial means to do so, are under an obligation to take and finance preventative measures aimed at protecting themselves and their property against potential risks (Throne-Holst et al., 2015, p.55). In order to facilitate this, MSB states that the purpose of conducting local, regional and national risks assessments is amongst other things to inform citizens on these possible risks (MSB, 2012b, p.15-16). One can imagine that a degree of citizen self-sufficiency is required due to the country's size and uneven population distribution. Sweden is roughly nine times the size of the Netherlands with a population of ten million, of which more than half live in just three of the country's 21 counties (Statistika Centralbyrån, 2016; Indexmundi, 2015).

Despite this high reliance on citizen behaviour and preparedness concerning potential crises and disasters in Swedish society, the topic remains largely unaddressed in the both the original 2012 risk assessment, the 2016 follow-up document as well as in any of the guidelines produced by the MSB on conducting this kind of exercise (MSB, 2012a; MSB, 2012b; MSB, 2016a; MSB, 2016b). For instance, when looking at the scenario covering the failure of a major dam and subsequent flooding of a substantial area of land, the preparedness, responsibilities or potential impact of citizens is not mentioned. When discussing main actors, the scenario limits itself to the company responsible for the dam, local authorities and private organisations as well as the MSB itself (MSB, 2016a, p.77). In addition, even when looking at the sections of each of the scenarios that address current capabilities, no reference is made to the legally required preparedness of citizens or their ability to assist. The SENRA also does not make a distinction between the levels of citizen preparedness in rural, isolated areas where one can expect citizens to be more self-reliant in general and more populated, accessible areas. Citizens are only discussed as being the subject of a state-led evacuation attempt under the auspices of fire and rescue services (MSB, 2016a, p.79). Whilst it is safe to assume that due to the partial reliance of the SENRA on quantitative data, information containing the impact of citizen behaviour have been incorporated in the overall assessment, this remains an implicit affair.

Despite the fact that Swedish citizens are expected to play an important role in disaster preparedness and response, this is not explicitly recognised in the SENRA. The potential impact of citizen behaviour when determining the impact of potential risks has only been taken into account to the extent that these effects are already incorporated in the historical, quantitative data used as part of the risk assessment process. It has remained an implicit affair and does not provide a solid enough basis for the initiative to be seen as in line with the normative framework concerning this subject. The final section of this chapter will summarise its main findings.

5.4 - Conclusion

This chapter has discussed the first European counterpart against which the NLNRA will be compared, posing the following question: What are the main underlying assumptions found in the SENRA with respect to the three points on which it will be examined and to what extent do these assumptions align with the normative framework? Following the discussion on the different parts of this question in the previous sections, an answer can now be formulated.

Section 5.1 on whether a comprehensive approach to national security has been adopted concluded that concerning this subject the SENRA is in line with the normative framework to the extent that it includes other interests than for instance sovereignty. Furthermore, the subjects of ecological stability, digital environment and cultural heritage have been included, be it in a relatively limited manner. However, despite the fact that every national value of protection is considered equal in the determination of the overall risk assessment, an unequal division of indicators between them may lead to some being awarded a score more quickly than others. Section 5.2 discussed how the way the SENRA approaches the concept of risk is only to a limited extent in line with a social-constructivist approach to risk as supported by this research's theoretical framework. Despite this, some qualitative elements have been included through the use of qualitative scales when assessing the socio-political impact of a particular risk and the adoption of a mixed-method design, with the latter also addressing any methodological limitations. Finally, section 5.3 concluded that the SENRA has only taken the effects of citizen behaviour into account to the extent that these effects are already incorporated in the historical, quantitative data used as part of the risk assessment process. It has remained an implicit affair, leading to the conclusion that the SENRA is not in line with the normative framework in this regard. The focus of chapter five will remain on Scandinavia as it will examine the Norwegian National Risk Analysis.

6 - The Norwegian National Risk Analysis

The 2011 Oslo bombing and the subsequent shooting on the small island of Utøya, resulting in a total of 77 fatalities, is arguably one of the most well-known crises or disasters that have hit Norwegian society in the past years (IFV, 2011). However, a terrorist attack comparable to the one above is not the only risk that can potentially affect Norwegian society. In order to gain a better understanding of the different risks that may affect Norway, the Norwegian Directorate for Civil Protection (DSB) conducts regular risk analyses. This chapter will examine the 2014 Norwegian National Risk Analysis (NONRA) with the aim of assessing its underlying assumptions and eventually help evaluate the NLNRA.

In order to achieve this, the following question will be considered: What are the main underlying assumptions found in the NONRA with respect to the three points on which it will be examined and to what extent do these assumptions align with the normative framework? As in the previous two chapters, this question is based on the second sub-question of this thesis. Concerning the overarching CMO framework, this part will examine the extent to which the national context may have led to different underlying assumptions being activated concerning the creation of the NONRA. Sections one to three will each focus on one of the points of analysis based on the normative framework. Section one will investigate whether the Norwegian analysis has adopted a comprehensive approach towards national security. This is followed by a discussion on how the NONRA defines the concept of risk in section two and an analysis in section three on whether citizen behaviour has been taken into account in the analysis. This chapter has been predominantly based on a document analysis of the extensive 2014 NONRA (DSB, 2014). Additionally, information has been retrieved from a review of the Norwegian civil security system (Hollis & Ekengren, 2013), an article on national risk regimes in Norway, Sweden and Iceland focusing on the Role of Citizens (Throne-Holst et al., 2015) and, finally, a piece by Aven and Cox (2016) on national and global risk studies featuring examples from Norway.

6.1 - A comprehensive Approach to National Security?

The NONRA adopts an all-hazard perspective and consequently considers a wide range of possible threats, from volcanic activity to nuclear accidents. This section will examine if the NONRA has adopted a similarly comprehensive approach in the way it defines its national security interests and whether all interests have been considered in an equal manner. Consequently, it will focus on the first main point of assessment in relation to the normative framework of this research. Next to a more general discussion,

special attention will be awarded to whether or not the subjects of the digital environment, cultural heritage and ecological stability have been included.

In order to define the overall potential impact of a risk, the NONRA considers its impact on five different societal assets that, in the eyes of the Norwegian government, require protection (DSB, 2014, p.25). The five societal assets together with the consequence types used to operationalise them can be found in figure 6.1 below.

Societal Assets	Consequence Types
Life and death	1.1 - Death 1.2 - Serious injuries and illness
Nature and culture	2.1 - Long-term damage to the natural environment 2.2 - Irreparable damage to the cultural environment
Economy	3.1 - Direct financial losses 3.2 - Indirect financial losses
Societal stability	4.1 - Social and psychological reactions 4.2 - Impact on daily life
Democratic values and capacity to govern	5.1 - Loss of democratic values and national capacity to govern 5.2 - Loss of territorial control

Figure 6.1: Societal Values in the NONRA (DSB, 2014, p.25-26)

When looking at the above figure, only one of the five societal assets, namely the category covering democratic values and the capacity to govern, relates to the protection of sovereignty. Consequently, it can be stated the NONRA has adopted a comprehensive approach from the outset. However, what is possibly the most striking feature when comparing the NONRA with the other two assessments discussed so far, is that every societal asset has the same amount of consequence types, or indicators. Having the same amount of indicators can help ensure that every impact category covers roughly an equal share of potential impact, with its eventual inclusion of course still being highly dependent on the specifics of the scenario under consideration. Nevertheless, when awarding one category with four indicators and another with only one or two, the former may be granted a structural advantage over the latter concerning its chances of being considered in the final impact determination. The more indicators a category has, the more all-encompassing it is likely to become and the higher the chances that one of the indicators can be seen as relevant in a scenario.

An example may be of use here. In chapter four, it was mentioned that the NLNRA only features one impact indicator related to environmental matters. The Norwegian document, due to the inclusion

of the “cultural” environment, features two indicators. Consequently, the Norwegian environmental impact category scores in 50 percent of all scenarios, whilst its Dutch counterpart only does so in roughly 27 percent (DSB, 2014; ANV, 2016a). It should of course be stated that part of this difference can be due to variations, for instance in scenario selection, but as both assessment documents cover a relatively similar set of events this does not explain the large difference (DSB, 2014; ANV, 2016a). The above example is not meant as a comparison between the two NRAs, which is the prerogative of chapter nine, but instead serves as a numerical example of the impact an additional indicator can have.

Turning to the subjects of the digital environment, cultural heritage and ecological stability, the discussion above has already provided some clues as to their inclusion. Both the natural and cultural environment have been awarded their own consequence type, put together in the nature and culture societal asset and focussing predominantly on long-term damage. Next to representing one fifth of all indicators, these subjects are also truly discussed in the scenario analyses in an equal manner to their peers. When looking at for the scenario covering flooding, the societal asset of nature and culture is awarded the same amount of attention as the asset of life and health or the economy (DSB, 2014, p.50). When it comes to the subject of the digital environment, however, it is only featured by way of two scenarios covering cyberattacks. Whilst the scenario covering a cyberattack on the financial infrastructure does mention a number of consequences that can be seen as related to the stability of the digital environment, these are discussed in terms of the societal values related to the economy or the capacity to govern. The NONRA does not feature a separate societal asset or even a consequence type related to cybersecurity or the stability of the digital environment (DSB, 2014). Consequently, even though the scenario in question does estimate the costs of the event to the economy at 0,5 to 5 billion NOK, it is not able to discuss its consequences on the stability of the digital environment or cybersecurity in general (DSB, 2014, p.186-189).

In conclusion, concerning the topic at hand the NONRA adheres to the normative framework to the extent that other national security interests than those relating to sovereignty have been included and in a very equal manner relative to each other. However, even though the subjects of cultural heritage and the natural environment have been properly included, this is not the case with regards to its digital counterpart. The following section will continue the discussion on the three main points of analysis.

6.2 - Approaching Risk in Norway

Even though this chapter features a discussion on the Norwegian Risk Analysis, a more existential discussion on how this concept of risk is approached has not been held yet. The section at hand will address this absenteeism by examining to what extent the NONRA has adopted a social-constructivist approach to risk, as introduced in chapter two on the theoretical framework. Three elements relating to the way the concept of risk is approached will be considered here. The way risk is defined in the NONRA and whether subjective elements related to the general concept are recognized will be discussed first. This will be followed by an analysis of the methods used to determine risk and the way methodological limitations are addressed. The final element to be discussed relates to the scales used by the NONRA in determining the scores for a specific scenario.

The NONRA acknowledges the concept of risk as being something fully subjective. It explicitly stresses that risk assessment is always based on a perception held by individuals and, consequently, one should not see it as something of an objective nature (DSB, 2014, p.19). This subjective approach is fully in line with a social-constructivist perspective on risk. Whilst the NONRA does not provide a concrete definition of risk, merely elaborating on how it approaches the concept, it can be concluded from the risk matrices and scenario analyses in the document that risk consists of the interplay between both likelihood and consequences (DSB, 2014). Despite this acknowledgement, the main purpose of the NONRA is to in fact help determine and map the various risks facing society (DSB, 2014, p.12). This presents somewhat of a conundrum. On the one hand it is stated that risk is a purely subjective concept, but, on the other, a to some extent universally valid document needs to be produced which can still be seen as useful input for government policy. This is resolved by making the premises on which the risk assessment is based as clear as possible, so others can verify the various steps made for themselves based on their own perception of risk (DSB, 2014, p.12). One of these premises relates to the way both likelihood and consequences are determined. The NONRA relies heavily on qualitative methods predominantly in the form of expert workshops when determining these two factors and, with the exception of natural events, openly rejects statistical methods in for instance determining likelihood (DSB, 2014, p.23). During these seminars experts from a wide range of backgrounds are requested to perform a strictly qualitative, non-mathematical analysis of a specific risk (Aven and Cox, 2016, p.188; DSB, 2014, p.28). The analysis for some of the scenario has still been partially based on historical experiences (DSB, 2014, p.27). The involvement of experts from many different disciplines addresses one of the main methodological limitations related to this type of analysis and the use of predominantly qualitative methods together fits within the social-constructivist approach. When looking at the scales

that are used to score the different risks, both likelihood and consequences are determined on the basis of a five point scale, ranging from very small to very large in terms of consequences and from very low to very high in terms of likelihood (DSB, 2014). These scales sometimes represent quantitative categories, such as the number of victims or the expected annual chances of occurrence for a specific natural event, in order to assist in the comparison. However, where applicable, a qualitative basis for the categorization of consequences and likelihood related to specific risks into different scales is used (DSB, 2014, p.13, 23 and 28).

The NONRA can be seen as having adopted a fully social-constructivist approach to the concept of risk and, consequently, as being fully in line with the normative framework in this regard. It acknowledges the inherent subjective nature of risk, uses predominantly qualitative methods in determining it and, when applicable, relies on equally qualitative scales when scoring risks. Furthermore, it relies on experts from different disciplines, being aware of the methodological issues related to a reliance on expert analysis. Even though it still to some degree relies on data from past events, this reliance is relatively low. The next section will discuss the final point of comparison.

6.3 - Citizen Behaviour and the NONRA

This section will discuss the extent to which the NONRA has taken into account the potential effects of citizen behaviour when determining the impact of different risks. By doing so, will focus on the third main point contained in the normative framework and assess whether the NONRA can be seen as in line with it.

Norwegian citizens are expected to prepare themselves for crises or disasters and are regarded as being co-responsible for their own safety but also to help look after others. Citizens are for example expected to assist in evacuation efforts, making their vehicles or even houses publicly available if requested (European Commission, 2015; Hollis & Ekengren, 2013, p.16-18; Throne-Holst et al., 2015, p.34). When looking at the NONRA, one of its striking features is that it explicitly mentions citizens as being a target audience. The NONRA can be seen as a document aimed at, amongst other things, helping citizens to prepare for possible calamities (DSB, 2014, p.16). However and contrary to this objective, citizens are approached as passive subjects throughout the document. This can be illustrated by looking at the two 'example' scenarios of both flooding and a terrorist attack. In the flooding scenario, no mention is made of the citizen's agency or capabilities. When for instance referring to evacuation efforts, it is merely stated that "10.000 citizens must be evacuated" (DSB, 2014, p.4). This phrase implies the evacuation effort to be a government-led affair, with the population as a more or less passive

subject that must “be” evacuated. This tendency can again be found in a discussion on the effects of the flooding on societal stability. Here it is argued that the population “will expect that the authorities manage the event well”, again putting the emphasis on government behaviour and the impact thereof over that of normal citizens (DSB, 2014, p.50). Here, the DSB does not make any differentiation between the people living in an urban or in a rural setting in which one can reasonably expect a slower response from the government and citizens may be more self-sufficient. The second scenario covering a major terrorist attack presents a similar discourse as the one above. In fact, citizens are only mentioned in the capacity of being victims. Of course one could argue that there is little individual citizens can do in the face of simultaneous terrorist attacks with the assailants using military grade equipment in the city centre of Oslo and that this can thus be viewed as a non-traditional risk, especially in the acute phase. However, even in the areas where this might be conceivable such as in providing support to victims, the impact of citizen behaviour is not addressed (DSB, 2014, p.170-172).

So far, the two example scenarios provide no evidence that the NONRA has taken the impact of citizen behaviour into account. Furthermore, the relatively high reliance of the NONRA on qualitative methods and input over more quantitative elements means that data on the impact of citizen behaviour used for the production of for example statistical models will be less likely to have been included via this more implicit route. Whilst there is no information available as to whether participants in the expert workshops explicitly discussed the topic at hand, the fact that citizen responsibility in the face of a crisis or disaster is a relatively important element of the Norwegian civil defence structure makes it unlikely that this element has not been discussed at all. However, this likelihood does not represent sufficient grounds for the NONRA to be seen as in line with the normative framework concerning the topic of citizen behaviour. Even if the matter has been discussed, this is not reflected in any of the scenario discussions by way of attributing a degree of agency to citizens or explicitly considering the impact of their behaviour. Having discussed the final main point of comparison, section four will conclude this chapter by providing an answer to the question posed in the introduction.

6.4 - Conclusion

This chapter has analysed the second European risk assessment against which the NLNRA will be compared. It has endeavoured to answer the following question: What are the main underlying assumptions found in the NONRA with respect to the three points on which it will be examined and to what extent do these assumptions align with the normative framework? Following the discussion in the previous sections, the question can now be answered for each of these three areas.

Section 6.1 concluded that the underlying assumptions of the NONRA is in line with the normative framework to the extent that other national security interests than those relating to sovereignty have been included and all have been awarded equal importance. Contrary to the stability of the digital environment, the subjects of cultural heritage and the natural environment have also been properly included. Section 6.2 has shown that the NONRA can be seen as having adopted a fully social-constructivist approach to the concept of risk. It was argued that this is the case as the NONRA acknowledges the inherently subjective nature of risk and uses predominantly qualitative methods as well as, where applicable, qualitative scales. Furthermore, methodological issues are addressed by relying on experts drawn from different disciplines. Section 6.3 discussed whether the impact of citizen behaviour had been taken into account during the creation of the NONRA. It concluded that even though the reliance on citizen responsibility in the civil defence structure makes it likely that this impact has at some point been discussed, this is not reflected in the way citizens are featured in the final risk assessment document. Furthermore, the reliance on predominantly qualitative methods makes it less likely that the impact of citizen behaviour has been included implicitly through a reliance on historical data. Consequently, concerning this third area, the NONRA is not in line with the normative framework. The next chapter will discuss the second non-EU NRA: the Swiss National Risk Analysis.

7 - The Swiss National Risk Analysis

Contrary to the situation in the Netherlands, government planners in Switzerland do not have to take into account the challenges related to living in a country partially below sea level. Nonetheless, severe flooding caused by heavy precipitation or surges in river levels due to water from melting snow and ice also threaten Swiss society (OFPP, 2015c). In order to determine whether it will be able to face this risk and others with a severe, complex and national impact, the Swiss Federal Office for Civil Protection (OFPP) has produced its first national risk analysis in 2013, followed by a more extensive and updated version in 2015 (OFPP, 2015a, p.I-II). The underlying assumptions of the most recent version of the Swiss National Risk Analysis (CHNRA) are the subject of this chapter which is structured around the following question: *What are the main underlying assumptions found in the CHNRA with respect to the three points on which it will be examined and to what extent do these assumptions align with the normative framework?* This question has again been based on the second sub-question of this thesis. When putting this chapter in the perspective of the overarching CMO framework, it will examine and assess according to the normative framework the different mechanisms or, in the case of this research, assumptions that have been triggered concerning the production of the CHNRA.

Following a similar structure to the previous three chapters, section one will start with a discussion on the first point of assessment: whether the Swiss analysis has adopted a comprehensive approach towards national security. Section two will focus on how the CHNRA has approached the concept of risk and section three will analyse whether citizen behaviour has been taken into account. The examination at hand has been based on a document review of a number of OFPP publications: the 2015 CHNRA document (OFPP, 2015a); methodological guidelines for risk analysis (OFPP, 2013) and the documents featuring the analysis of the different scenarios contained in the CHNRA, in particular those discussing flooding and a conventional terrorist attack (OFPP, 2015c; OFPP, 2015b). In addition, an evaluation of the Swiss civil security system (Hegemann & Bossong, 2013) as well as an article on the role of citizens in defence and civil protection (Tresch, 2011) have been consulted.

7.1 - A Comprehensive Approach to National Security?

The different scenario analyses related to the CHNRA determine, among other things, the consequences of a specific event. This section will focus on the question of what interests of Swiss society, on which these events can have a potential impact, are featured in the CHNRA. It will ask if other interests than sovereignty and with it the notion of territorial integrity have been taken into account in the CHNRA and

whether these have been included in an equal manner, focusing on the first point on which the underlying assumption of the CHNRA will be assessed. This section will pay special attention to the inclusion of the stability of the digital environment, cultural heritage and ecological stability.

In line with the three assessments discussed so far, the CHNRA has defined a number of societal interests, referred to as subjects of protection, together with related damage indicators in order to help determine the impact of different risks. These can be seen in figure 7.1 below.

Subjects of Protection	Damage Indicators
Individuals	1.1 - Fatalities 1.2 - Casualties/sick people 1.3 - Individuals in need of assistance
Environment	2.1 - Damaged ecosystems
Economy	3.1 - Asset losses and cost of coping 3.2 - Reduction of economic performance
Society	4.1 - Supply shortfalls and disruption 4.2 - Diminished public order and domestic security 4.3 - Reputational damage 4.4 - Loss of confidence in state/institutions 4.5 - Reduction of territorial integrity 4.6 - Damage to and loss of cultural goods

Figure 7.1: Subjects of Protection in the CHNRA (OFPP, 2013, p.9)

As the above table features a variety of subjects of protection and indicators going beyond the notion of sovereignty, with 4.5 referring to the more territorial aspects of the term and 4.4 to some extent to the state having effective control over its territory, the focus of this section will be on the matter of equal inclusion of the different subjects.

The CHNRA does not attribute an individual impact score to each of the subjects of protection. Instead, it awards each of the 12 indicators a score based on a scale from A1 for the lowest possible impact and A8 for the highest. This score can be based on for instance the amount of deaths or economic values. For every indicator the impact scores of A1 to A8 are awarded a monetary value in CHF. By adding up these values, impact of a specific risk is determined (OFPP, 2013, p.10-22). Figure 7.2 shows this exercise as graphically presented for the scenario covering major flooding.

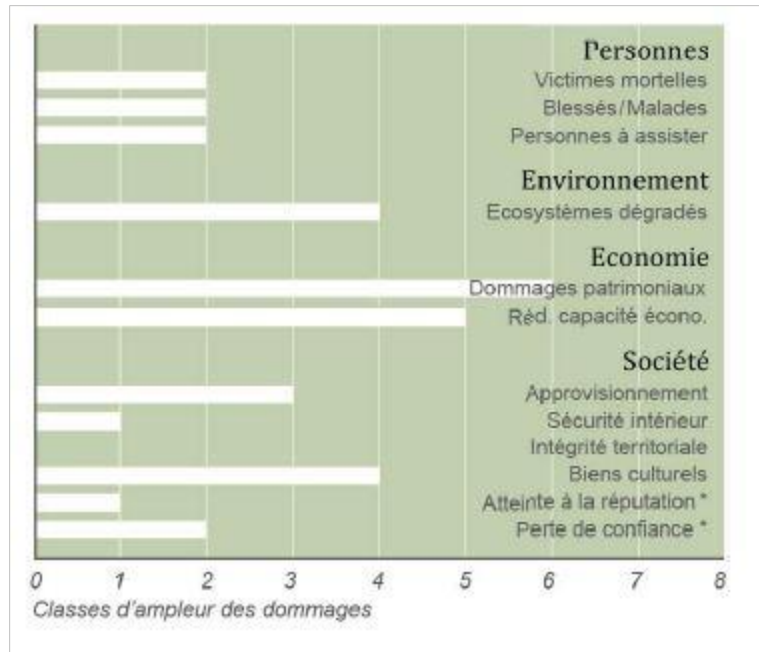


Figure 7.2: Scoring Table of the CHNRA – Flooding (OFPP, 2015a, p.25).

Each of the indicators is awarded a score from one to eight, with the two indicators related to the economy scoring the highest in the case of flooding. This method ensures the equal inclusion of each of the indicators as the final determination of impact is based on the simple adding up of the respective values attributed to each indicator in CHF. When looking at the subjects of protection level, a similar issue arises as seen in both the NLNRA and the SENRA related to the unequal distribution of indicators amongst them. Especially concerning the subject of protection related to the environment, a structural disadvantage for its inclusion may exist. However, this situation may not be problematic in the case of the CHNRA as it does not rely on an overall score for each of the subjects. Put differently, a structural disadvantage concerning the inclusion of the subject of protection related to the environment may not be of major importance as it, similar to its peers, is not included in anything. The overall impact determination is entirely based on the total sum of each of the indicator scores. Of course, with only one indicator, ecological matters are still underrepresented in this final sum.

Turning to the three subjects of special interest to this research, both an indicator related to the natural environment as well as one covering cultural assets can be found on the list featured in figure 7.1. As mentioned above, even though environmental elements are included, this has been done in a relatively limited manner. By comparison, the detailed nature of criterion 4.6 relating to the damage to and loss of cultural goods is especially striking. The Swiss analysis explicitly covers the costs of the destruction, damaging, theft and restoration of regional, national and world heritage. Furthermore, its

wide-ranging definition of what constitutes cultural goods not only ranges from archaeological sites to manuscripts, but also includes those places that are used to potentially warehouse and protect them (OFPP, 2015a, p.21). As will be discussed in chapter eight, this represents a substantial departure from the approach in the other NRAs examined by this thesis. Contrary to the detailed inclusion of the subject of the protection of cultural heritage, none of the indicators covers the stability of the digital environment (OFPP, 2013).

In conclusion, the CHNRA is in line with the normative framework by way of adopting a comprehensive approach towards national security. A striking feature is the extensive impact criterion relating to the protection of cultural heritage. Whilst some of the subjects of protection may have a structural advantage over others due to the uneven distribution of indicators, the fact CHNRA does not provide an aggregate score on these subjects of protection in determining overall impact, but instead relies heavily on the scores awarded to the individual indicators makes this less problematic. Yet, with only one indicator ecological matters remains underrepresented. Finally, the subject of the digital environment is not represented in any of the indicators. The next section will continue with a discussion on the second point of assessment.

7.2 - Approaching Risk in Switzerland

The introduction of this chapter mentioned that Swiss society faces, amongst other things, the risk of flooding due to precipitation and melting snow and ice. This section will not focus on what societal interests this threat may affect, but rather on how the more general concept of risk is approached by the OFPP in creating the CHNRA. More specifically, this section will analyse to what extent the CHNRA has adopted a social-constructivist approach to risk similar to the one elaborated upon in chapter two. As is the custom in this thesis, three specific elements will be considered in order to answer this question. First of all, the way the CHNRA defines risk and, second, an analysis of the methods used to determine risk as well as the way methodological limitations are addressed. Finally, the scales used by the CHNRA in determining the scores for a specific scenario and whether these are of a qualitative or quantitative nature will be discussed.

Starting with the first element, the CHNRA defines risk as “a certain degree of potential danger associated with a particular event, which is the result of the interaction between its probability of occurrence and negative consequences for the population as well as its bases of existence.” (OFPP, 2015a, p.7). Neither the above definition with its focus on the more statistical term of probability nor any of the discussions in the CHNRA document acknowledges the existence of a subjective dimension to

the general concept of risk (OFPP, 2015a; OFPP, 2013). When moving on to the methods used by the CHNRA to determine the two underlying elements of the Swiss definition of risk, probability and consequences, some more social-constructivist elements come to light. In general, expert working group sessions represent the methodological backbone of the CHNRA in a number of ways. To start with, the CHNRA recognises that it may not always be possible to determine probability or statistical frequency for a specific risk. Thus, with regards to risks of a malicious, manmade nature, a more qualitative, expert-based assessment of likelihood instead of a statistical probability analysis has been adopted, resulting in the aforementioned separate risk matrix. These qualitative assessments are based on the so-called Delphi method where different experts start by assessing the likelihood of an event on an individual basis. After this, the minimum and maximum estimates are identified and form the basis of a moderated discussion between all experts, hopefully resulting in a final consensus (OFPP, 2013, p.26; OFPP, 2015a, p.11-12). Second, the same expert-based Delphi method is used to validate the more statistical probability assessments used for the majority of the risks described in the CHNRA (OFPP, 2013, p.5; OFPP, 2015a, p.13-14). Consequently, it can be stated that the conclusions reached for each of the scenarios are partially based on both qualitative and quantitative methods. The application of this mixed method design, together with the input of experts from a wide range of disciplines during the workshop sessions helps address the methodological limitations of both statistical and expert-based analysis. In particular, the Delphi method forces these experts to engage in a dialogue on their individual findings, reducing the chances of the results of the CHNRA being based on personal biases and respecting the diversity of perspectives.

When looking at the scales that are used to award the different risks a location in the risk matrix, the CHNRA contains an elaborate impact scoring matrix for each of the indicators which attributes a score from one to eight, eight being the highest. The underlying parameters used to award this score have been tailor made for each of the 12 indicators (OFPP, 2013, p.10-21; OFPP, 2015a, p.49-50). However, one of the more striking features of the CHNRA is the fact that it subsequently translates these scores to a monetary value, irrespective of the underlying parameters on which they are based (OFPP, 2015a, p.7, 18-19). This is contrary to the scales used to determine likelihood or probability, which are translated into two separate matrixes in order to avoid this translation. By converting the impact scales, the CHNRA to an extent contradicts itself: For some risks it acknowledges the need for qualitative impact scales, but it subsequently goes on to translate these into Swiss Francs.

Summarising, the CHNRA adopts a social-constructivist approach only to a limited extent and, thus, also to the normative framework. Whilst the CHNRA does make use of a mixed methods approach

and features both quantitative and qualitative scales, there is no recognition of the subjective elements related to the general concept of risk. Furthermore, even though a number of the scales used to score the different impact indicators are qualitatively defined, they in the end translated into numerical values. The use of the Delphi method and the aforementioned mixed-method approach does however ensure that methodological limitations are addressed. The next section will continue with a discussion on the final main point of assessment.

7.3 - Citizen Behaviour and the CHNRA

The Swiss political system is not only defined by the unique relation between the federal government and the different Cantons as discussed in section 3.4, but also by the system of direct democracy in the form of regular referenda. The section at hand will analyse if the Swiss government takes the behaviour of their citizens during times of crisis into account in an equal manner as it does with their opinions in the political area. More precisely, it will assess whether the CHNRA's underlying assumptions concerning the taking into account of citizen behaviour are in line with the normative framework of this thesis.

Switzerland imposes a wide range of obligations and responsibilities on its citizens when it concerns security, preparedness and civil protection. To start with, Switzerland has an extensive system of conscription, sometimes referred to as the militia system. Citizens are required to perform either a social, a military or a civil protection service (Hegemann & Bossong, 2013, p.19). Whilst in most countries military conscription will only last for a year after which conscripts join a national reserve programme, Swiss citizens often serve for multiple years spread over a prolonged period of time. This is due to the fact that the federal government is constitutionally not allowed to have a professional standing army. Consequently, citizen conscripts play a significant role in senior officer positions as well (Tresch, 2011, p.240-241). Next to the militia system, individual citizens are also legally obliged to prepare themselves for a disaster of crisis and, in some Cantons, citizens are even subject to mandatory temporary recruitment by civil protection services in times of emergency or are expected to make their homes available to the authorities (Hegemann & Bossong, 2013, p.19-20).

Thus, one can safely state that Swiss citizens, due to their extensive involvement in the military or civil protection services as well as the obligation to prepare for calamities, have the knowledge and capacity to act in an adequate and constructive manner during times of emergency, at least when it concerns traditional risk such as flooding or earthquakes. Nonetheless, especially in the scenario descriptions, the potential positive impact of citizen behaviour on eventual impact is not discussed. The scenario covering major flooding exemplifies this. In the scenario description no mention is made of

citizens or their ability to help in efforts aimed at subduing the flood waters. At one point, when discussing the construction of barriers made of sandbags and similar materials, it is merely stated that there will probably be a shortage of equipment and personnel (OFPP, 2015c, p.7). Even in an area where most citizens, many of which have had military training, can easily contribute, they are not considered. The only point at which citizen behaviour is truly discussed is when the scenario mentions the need for additional police and army patrols in order to deter people from looting in areas affected by flooding (OFPP, 2015c, p.9). A discussion which, according to Helsloot and Ruitenberg, is based on the unsubstantiated myth that people will resort to looting and mischief following a disaster (2004, p.103). Even though citizen behaviour, or at least the positive effect it may have on the consequences of a crisis or disaster is not taken into account in the scenario analyses, there is a difference between the CHNRA and the other risk assessment discussed so far. The CHNRA does explicitly acknowledge the fact that a well-prepared populous which knows how to act in the face of emergencies can help emergency services in effectively responding to any disaster or crisis (OFPP, 2015a, p.43). However, this is only done in a discussion and review section in the final part of the document, not in the actual risk analysis besides its probable inclusion in historical impact data. Also in the CHNRA, no distinction is made between expected citizen behaviour in rural or urban areas (OFPP, 2015a; OFPP, 2015b; OFPP, 2015c).

Consequently, even though the potential impact of citizen behaviour is recognised, the fact that the effects thereof have not been taken into account during the analysis results in a situation where it is not possible to see the CHNRA as being in line with the normative framework in this regard. The next section will provide a conclusion to this chapter.

7.4 - Conclusion

This chapter has taken it upon itself to analyse the underlying assumption of one of the European counterparts of the NLNRA. The analysis of the CHNRA has been aimed at answering the following question: *What are the main underlying assumptions found in the CHNRA with respect to the three points on which it will be examined and to what extent do these assumptions align with the normative framework?* As the preceding sections have each addressed one of the three points of assessment for the CHNRA, an answer to the above question can now be presented following a similar structure.

Section 7.1 analysed the underlying assumptions related to the first main point of assessment of whether a comprehensive approach to national security has been adopted. It was concluded, here, the CHNRA is in line with the normative framework to the extent that it has done so, despite the fact that some of the subjects of protection have a structural advantage over others due to the uneven

distribution of indicators. Finally, Whilst the subject of the stability of the digital environment has not been included, cultural heritage and ecological stability have been awarded their own indicators with the former being particularly extensive. Section 7.2 continued with the second point by examining to what extent the CHNRA has adopted a social-constructivist approach to risk and, by doing so, is aligned with this research's normative framework. It concluded that this was the case to only a very limited extent as subjective elements related to risk were not recognised. Furthermore, even though a mixed method approach was used as well as qualitative scales for a number of impact indicators, the latter are all translated to numerical values for the purposes of the risk matrix. Third, section 7.3 concluded that the CHNRA has failed to take the impact of the behaviour of citizens into account in the actual scenario analysis, only recognising citizen agency by way of a side note in the back of the document without giving it any further implications. Thus, also the CHNRA fails to adhere to the normative framework concerning this final point.

Before chapter nine provides an overview and comparison of the assessments performed in the five country case studies on underlying assumptions, the next chapter will feature the last of the country cases to be discussed in this thesis: the Polish National Risk Assessment.

8 - The Polish National Risk Assessment

According to the 2015 Polish National Security Strategy, the currently deteriorating relations between the Russian Federation and the West are of major influence on Polish security (PNSB, 2015, p.21). Of course it is not just potential Russian aggression towards its immediate neighbours that has the potential of negatively affecting Polish society. The Polish National Risk Assessment (PLNRA), not to be confused with the above strategy, puts a large range of different risks that threaten Polish society into a comparative perspective. It goes beyond military threats posed by the country's Eastern neighbour and includes risks such as flooding and wildfires. The PLNRA is the subject of this chapter as it addresses the following question, based on the second sub-question of this thesis: *What are the main underlying assumptions found in the PLNRA with respect to the three points on which it will be examined and to what extent do these assumptions align with the normative framework?* Seen from the perspective of the CMO framework, this chapter focusses on the underlying assumptions that were triggered in the production of the PLNRA. The results of the assessment of the PLNRA will eventually be used to help produce possible recommendations for the 2020 NLNRA.

This chapter discusses the three points of assessment in the same order as the previous four case studies. First, section one examines whether a comprehensive approach to national security has been adopted. This will be followed by section two on the way risk is approached in the PLNRA. Section three completes the discussion on the three main points of comparison with an analyses of the extent to which the impact of citizen behaviour has been taken into account. Finally, section four is to present a conclusion. The discussion on the above three points has been based on a number of sources. First of all, the PLNRA document itself (RCB, 2015) has been consulted. Furthermore, information has been retrieved from a peer review of the Polish disaster management system (Agius, J., Harrami, O., Raeva, L. & Bicer, C.T., 2016), an analysis of the Polish civil security system (Matczak & Abgarowicz, 2013) and an academic article on the PLNRA (Leduchowska & Pyznar, 2015). Additionally, a questionnaire was send to the RCB for some additional clarification. The questionnaire can be found in attachment four. Contrary to the other risk assessments analysed in this thesis, the PLNRA is partially classified (RCB, 2015, p.3). This means that some of its features will, inevitably, remain undisclosed.

8.1 - A comprehensive Approach to National Security?

This section contains the final discussion on the first main point of assessment before the results from each of the five country cases are put together in chapter nine. In order to facilitate the comparison, this

section asks a similar question as its four predecessors in determining the alignment of an NRA with the normative framework: Whether other interests than sovereignty and with it the notion of territorial integrity have been taken into account in the PLNRA and whether these have been included in an equal manner. Again, special attention will be paid to the inclusion of three subjects: the stability of the digital environment, cultural heritage and ecological stability.

For this research to be able to answer the first part of the above question, if other interests than sovereignty have been taken into account, a closer look is needed at the figure below.

Impact Categories	Consequence Areas
Population	1.1 - Casualties 1.2 - Injured 1.3 - Increased incidence of certain diseases 1.4 - Necessity of evacuation 1.5 - Disruption of transportation 1.6 - Panic/stress 1.7 - Increased rate of crime/public disturbance
Economy/property/ infrastructure	2.1 - Damage to/ disturbance in the functioning of supply infrastructure 2.2 - Damage to/ disturbance in the functioning of ict infrastructure 2.3 - Damage to/ disturbance in the functioning of transport infrastructure 2.4 - Damage to/ disturbance in the functioning of residential buildings and public buildings 2.5 - Possible increase in unemployment rate 2.6 - Losses in the national heritage 2.7 - Damage to breeding and/or harvest
Environment	3.1 - Damage 3.2 - Degradation 3.3 - Damage to/degradation of valuable natural areas or protected areas 3.4 - Possible extinction/reduction of population of given animal/plant species

Figure 8.1: Unclassified impact Areas in the PLNRA (RCB, 2015, p.34, 36, 38)

Figure 8.1 shows the three impact areas considered in the PLNRA as well as the accompanying list of indicators. When looking at the figure, it is obvious that each of the themes essentially covers an area that has little or nothing to do with the notion of than sovereignty. However, it is very well possible that figure 8.1 does not present the complete picture. Looking at the impact areas, there are some notable absentees. To start with, as the classified version of the PLNRA also discusses terrorist, political and

military threats, one would expect there to be some sort of impact indicator covering subversion of the Polish democratic state, territorial integrity and the ability for the Polish government to effectively govern it. In reality, it is very likely that these or similar impact categories and related indicators do exist, but that they are simply classified. In the questionnaire that was sent to Poland in order to clarify a number of elements of the PLNRA, RCB confirmed that this part is in fact classified. Thus, whilst other interests than sovereignty have been taken into account, it is not exactly clear how interests related to sovereignty itself have been incorporated in the document.

Next to the classified nature of parts of the PLNRA document, another defining feature of the document is the function of the indicators or consequence areas. One of the findings resulting from the questionnaire sent to the RCB is that the indicators featured in the PLNRA have a strictly informative role. They have no function in determining overall impact. When looking at the example of flooding, an expected consequence is a loss in national heritage. The extent of these losses is however not discussed in detail and, in turn, not used as a basis for impact assessment. In the case of flooding, the consequence area of losses in cultural heritage is merely checked with a 'yes' (RCB, 2015, p.36). This also means that even though the subjects of cultural heritage and the stability of the digital environment have, in the broadest sense of the term, been included by way of consequence areas 2.2 and 2.6, they do not have any impact on the determination of overall consequences. Thus, from the perspective of this thesis these two subjects have not been included.

However, does this line of reasoning also apply to the different impact areas and, consequently, for the subject of ecological stability? When looking at the requirements for the Voivodships concerning the fragmentary reports, they are at least asked to award a specific score to the different impact areas (Leduchowska & Pyznar, 2015, p.87-88). Thus ensuring that the impact categories have a function beyond being of an informative nature. However, this is only the case when looking at the fragmentary reports used in the compiling of the PLNRA. From the questionnaire it became clear that for the purposes of the overarching PLNRA, there is no direct link between the discussion on impact areas in the national document and the overall determination of impact. Nonetheless, because the impact area of the environment has been taken into account in the regional reports for the determination of regional consequences and these reports have, in turn, been used to determine national consequences, it is hard to see how the subject could not have had any influence on the latter at all. Consequently, the subject of ecological stability can be seen as included in the PLNRA. As a final note, the classified nature of a number of the impact categories makes it unfeasible for this research to determine to what extent each of the impact categories has been taken into account in an equal manner.

Concluding, even though not all impact categories are declassified, it can be stated that the PLNRA has adopted a comprehensive approach to national security and adheres to the normative framework by doing so. However, whether each of the impact categories has been taken into account in an equal manner remains unclear. Finally, whilst the subject of ecological stability has been included, this could not be said concerning cultural heritage and the stability of the digital environment. The list of indicators in which they have been included merely serves an informative purpose. Section two will continue with an analysis of the second point of assessment.

8.2 - Approaching Risk in Poland

As the way risk is approached presents a key feature of any risk assessment, this will also be analysed when it concerns the PLNRA. This section will address the question of to what extent the PLNRA has adopted a social-constructivist approach to risk. In line with the discussion in chapter two on the normative framework, three elements will be analysed in order to answer this question: the way risk is defined and whether, in general, subjective elements related to the concept have been acknowledged, the methods used to determine risk as well as the way methodological limitations are addressed and, finally, the scales used to determine the scores of a scenario.

The way the PLNRA defines risk differs from the classical perspective's impact times probability approach. According to the PLNRA, risk is a combination of the consequences and likelihood of a given event (RCB, 2015, p.8). However, this is not followed by any form of recognition of subjective elements related to the general concept in the PLNRA document. Nonetheless, it was mentioned in the questionnaire that RCB recognises that each of the voivodships brings in their own unique perspective on the different risks when writing the fragmentary report. The methods used in compiling all the reports that form the basis of the PLNRA represent a wide range of different approaches. Next to making use of qualitative methods such as expert assessments and scenario mapping on the one hand and statistical probability analyses on the other (Agius et al., 2016, p.24-25). Whilst these methods may appear familiar after the four preceding country case studies, the PLNRA differs in adding a third approach: an IT application called ARMOR. The application assists users in determining likelihood and consequences of a particular risk by asking a set of 'yes' or 'no' questions. Following the data input, the programme is able to produce a risk matrix. The main benefit of the ARMOR software is that it enables non-expert users in determining risk levels. This can be especially relevant at lower administrative levels where expertise may not always be readily available (Agius et al., 2016, p.33-34). Furthermore, it can be seen as a third way of adding to a mixed-method approach and, thus, amongst other things

circumventing potential expert bias. Of course, one can question to what extent the software's algorithms take into account a subjective approach to risk.

The use of the above methods has the final goal of awarding the different scenarios a specific place in the risk matrix. The scales used in determining the various risks levels are of a qualitative nature. Even when considering for example the number of fatalities, the different fragmentary reports that together make up the PLNRA use descriptive impact scales, not adhering to a 'bracket' system (1-10, 10-100 fatalities, etc.). Instead, consequences range from irrelevant with "no fatalities or injured people", to disastrous with "A large number of seriously injured. [...] A large number of fatalities." (Leduchowska and Pyznar, 2015, p.88). Following the questionnaire, RCB confirmed that it did not want to use strictly defined scales when it comes to for instance the number of casualties. However, it was also mentioned that this may change in future editions. The scales covering likelihood contain both qualitative and quantitative elements in their description, with the latter referring to the expected annual occurrence. This ranges from once in every 500 years or more when likelihood is considered to be very rare to once a year or more for when it is seen as very likely (Leduchowska and Pyznar, 2015, p.87).

In sum, the PLNRA in a number of areas has adopted a social-constructivist approach to risk to the extent that it makes widespread use of predominantly qualitative scales and a solid mixed-method design supported by the ARMOR software. However, despite the mentioning of likelihood instead of probability in the definition of risk provided by the PLNRA, there is no further recognition of subjective elements related to the general concept of risk besides the fact that the different Voivodships approach it from their own perspective. Because of this, it is not possible to view the PLNRA as having adopted a social-constructivist approach and adhering to the normative framework of this thesis to a large extent, as was the case with the NLNRA, which does acknowledge subjective elements related to the general concept of risk. However, due to the widespread use of qualitative scales and the extensive mixed-method design, it is more social-constructivist than the CHNRA or the SENRA. Thus, the PLNRA can be seen as having adopted a social-constructivist approach to risk to a moderate extent. The next section will discuss the final point of assessment.

8.3 - Citizen Behaviour and the PLNRA

As can be seen in figure 8.1, the PLNRA contains seven consequence areas related to the population. Whilst certainly comprehensive, this set does however not give an indication of the extent to which the Polish government in the form of the RCB and the different Voivodships that have contributed to the

overarching assessment have taken the actual behaviour of this population and its effects during a crisis or disaster into account as well. It is up to this section to assess whether the PLNRA has managed to take the behaviour of Polish citizens and the impact thereof at times of crisis or disaster into account and, consequently, can be seen as adhering to the normative framework.

When asked by way of the questionnaire whether the impact of citizen behaviour had been taken into account in the production of the PLNRA, the RCB replied that it had not done so. Whilst no further explanation was given by the RCB in the questionnaire, a study on the Polish civil security system by Piotr Matczak and Grzegorz Abgarowicz (2013, p.19-20) provides some information on why this could be the case. The authors point to the legacy of the communist era in Poland as a determining factor in the relation between the state and its citizens when it comes to civil protection. As the communist state used to have a dominant position in almost all aspects of daily life, citizens expected and to some extent still expect the government to take centre stage in the case of a crisis or emergency (Matczak & Abgarowicz, 2013, p.19-20). From the side of the government, this attitude been allowed to survive because politicians feel the need or even pressure to take care of their constituents and secure their votes by way of promising and proving unconditional assistance (Matczak & Abgarowicz, 2013, p.4). To be clear, this thesis does not state that Polish citizens are not capable of fending for themselves in times of crisis or emergency. It is for example hard to imagine bystanders not providing first aid to victims in their vicinity, instead waiting for the government to arrive and address the situation, the more because completing a first aid course is mandatory in Poland (Matczak & Abgarowicz, 2013, p.19). Citizen involvement merely has not reached its full potential due to the above legacy from the Soviet era. This, naturally, results in a discussion on the metaphorical 'chicken and the egg'. Should, for example, the RCB first change its expectations towards citizens in the PLNRA, or should citizens first change their expectations towards the role of the state during emergencies. Whilst certainly an interesting discussion, prescribing policy decisions to a foreign government is beyond the scope of this thesis.

Returning to the PLNRA, it is likely that despite the fact that the effects of citizen behaviour have not been explicitly taken into account, it will probably have been included to at least some extent by way of the historical data used in analyzing the different scenarios. Nonetheless, this does not present sufficient grounds to state that the PLNRA is in line with this research's normative framework. The next and final section of this chapter will provide a summary of the discussion.

8.4 - Conclusion

This chapter has discussed the last of the country cases contained in this thesis. Whilst doing so, it has focussed on the following question: What are the main underlying assumptions found in the PLNRA with respect to the three points on which it will be examined and to what extent do these assumptions align with the normative framework? Following the above discussion on underlying assumptions of the PLNRA, this question can now be answered for each of the three points. However, as the document is partially classified, some uncertainties do still remain.

Section 8.1 concluded that the PLNRA has adopted a comprehensive approach to national security, featuring other interests than those related to sovereignty. However, as some impact categories are classified, amongst which those related to sovereignty, it is unclear whether all of them have been included in an equal manner. Whilst the subject of ecological stability has been included via its own impact category, the subjects of cultural heritage and the stability of the digital environment are only featured in the list of indicators. As this list only has an informative purpose, the two subjects have not been properly included. Nonetheless, the PLNRA can still be seen as in line with the normative framework concerning this point. Section 8.2 stated that the PLNRA has adopted a social-constructivist approach to risk to a moderate extent. Whilst making widespread use of predominantly qualitative scales and a solid mixed-method design supported by the ARMOR software, it does, however, not recognise subjective elements related to the general concept of risk besides the fact that the different Voivodships approach it from their own perspective. Finally, section 8.3 concluded that in terms of taking into account citizen behavior, the PLNRA is not aligned with the normative framework as the only way this could be the case is implicitly through the use of historical data. The next chapter will combine the results of the five case studies on underlying assumptions.

9 - Comparing Assumptions

In 2009 the Organisation for Economic Co-operation and Development (OECD) marked both the Dutch and UK national risk assessment exercises as a best practice (OECD, 2009, p.40). The past five chapters have not only discussed and assessed the underlying assumptions found in the NLNRA, but also those found in four of its European counterparts with the aim of generating possible suggestions for future versions of the NLNRA, helping it retain this best practice status. This chapter will discuss how the results of these five separate assessments of underlying assumptions compare to each other. In doing so it will address the final sub-question of this thesis: What are the main differences and similarities between the underlying assumptions found in the five risk assessments in terms of their alignment with the normative framework?

Seen from the CMO model, this chapter brings together the different mechanisms triggered in the five national contexts in relation to the production of a national risk assessment and compares how they relate to the normative framework. This can be seen as a first step towards generating recommendations for the improvement of the NLNRA, which will be presented in chapter ten. In order to answer the above sub-question, the first three sections will each focus on one of the three main points of assessment concerning underlying assumptions. The first part of these sections will present a comparative table featuring the results of the analyses and assessments conducted in the country case studies for each of the five NRAs. This will be followed by a discussion on main differences and similarities. As usual, the first point to be considered is the extent to which the risk assessments have adopted a comprehensive approach to national security, followed by the extent to which they have adopted a social-constructivist approach to the concept of risk in section 9.2. The extent to which citizen behaviour has been taken into account will be considered in section 9.3. Finally, section 9.4 provides a conclusion.

9.1 - Comparing Assumptions: A Comprehensive Approach?

The first main point of assessment on the underlying assumptions used in the production of a NRA asked whether a comprehensive approach to national security has been adopted. More precisely, it analysed whether other interests than sovereignty and with it the notion of territorial integrity have been taken into account and whether these have been included in an equal manner. Furthermore, in the country case studies special attention has been awarded to the question of whether the subjects of the stability of the digital environment, cultural heritage and ecological stability. Here, it was not asked whether

these subjects are represented by way of a scenario covering for example cybercrime, but rather whether they were considered as interests that could be affected in their own right. Figure 9.1 below shows the results of the five assessment.

Countries	Comprehensive	Equal Inclusion	Cultural Heritage	Ecological Stability	Digital Environment
The Netherlands	Yes	Limited	No	Limited	No
Sweden	Yes	Limited	Limited	Limited	Limited
Norway	Yes	Yes	Yes	Yes	No
Switzerland	Yes	Limited	Yes	Limited	No
Poland	Yes	Unknown	No	Yes	No

Figure 9.1: Summary Table First Main Point of Assessment

Looking at the above figure, a number of differences and similarities can be found in terms of the alignment of the underlying assumptions found in the five NRAs with the normative framework of this thesis. First of all, as can be seen in the second column, all NRAs have adopted a comprehensive approach to national security. Thus, in this regard all five NRAs are equally in line with the normative framework. Second, the third column shows that the SENRA and CHNRA and NLNRA have however not managed to include all of the interests in an equal manner. Contrary to the NONRA, these assessments do not have an equal distribution of impact indicators in relation to the societal interests they take into account when determining overall impact. As a societal interest with five indicators is more likely to be awarded an impact score than one with only two, there is a certain level of inequality between them. This argument is of course based on the assumption that all indicators are roughly equally comprehensive, which appears to be the case. Third and turning to the inclusion of the three subjects of special interest, there are substantial differences related to the inclusion of cultural heritage. Whilst the NLNRA and PLNRA have not included it, the CHNRA, NONRA and SENRA have in fact done so done, though Sweden only to a limited extent. In terms of the subject of ecological stability, the SENRA, CHNRA and NLNRA are less aligned with the normative framework than their peers. Finally, when it comes to the stability of the digital environment, none of the NRAs has truly paid attention to it with the exception of the SENRA, which has still only considered it to a limited extent.

Concluding, a main similarity between the underlying assumptions found in the five NRAs and their alignment to the normative framework on the first point of assessment is that all have adopted a comprehensive approach to national security. However, only the NONRA can be seen as having included all national interests in an equal manner relative to each other. Furthermore, especially in relation to the inclusion of the subjects of cultural heritage and ecological stability large differences exist. However, none of the NRAs with the possible exception of the SENRA have included the subject of the stability of the digital environment. The next section will continue with the second point.

9.2 - Comparing Assumptions: Approaching Risk

The second main point of assessment on underlying assumptions asked to what extent the different NRAs have adopted a social-constructivist approach to risk and, by doing so, are in line with the normative framework of this thesis. In order to answer this question, it analysed how the different NRAs have defined risk and whether, in general, subjective elements were recognised. Furthermore, it examined the methods used by the five NRAs to determine risk as well as how methodological limitations are addressed. Finally, for every NRA the question was asked what scales that are used in order to help determine the location of a specific risk in the risk matrix and whether these are of a predominantly qualitative or quantitative nature will be discussed. For a NRA to be seen as having adopted a social-constructivist approach to risk, section 2.3 stated that it should approach risk as an inherently subjective concept, not rely solely on quantitative methods in determining impact and probability, acknowledge the subjective nature of risk in the scales it uses for comparing risks as well as be aware of and address any methodological limitations.

Figure 9.2 on the next page presents the results concerning this second point for each of the five country cases. The comparative table shows that the underlying assumptions found in the five NRAs differ in terms of their alignment with the normative framework. A first difference can be found in the fact that only two NRAs, the NLNRA and the NONRA partially or completely explicitly recognise the subjective elements related to the concept of risk, as seen in the second column of figure 9.2 below. In order to determine whether the NRAs have recognised the subjective nature of risk, the case studies have not only focussed on whether they have done so explicitly, but also on whether this is reflected on the definition of risk provided by the documents themselves. as shown in the second column of the above figure, the one contained in the Dutch assessment, with its focus on likelihood instead of the more statistics related term of probability, is very similar to the ones used in Sweden and Poland. The CHNRA, on the contrary, does mention probability in its definition of risk and is thus less in line with a

social-constructivist approach. The NONRA represent a complete departure from the other four NRAs in this regard by stating that risk is fully subjective and, as a result, not even providing a working definition.

Countries	Definition	Subjective Elements	Methods	Scales	Social-Constructivist
The Netherlands	The interplay between impact and likelihood.	Objective and subjective at the same time	Qualitative and quantitative	Qualitative and quantitative	Large extent
Sweden	Weighing together of the likelihood that an incident will occur and the (negative) impacts that this could conceivably have	No mention of subjective elements	Qualitative and quantitative	Qualitative and quantitative	Limited extent
Norway	As risk is subjective, no explicit definition is provided	Fully subjective	Qualitative	Qualitative and quantitative	Fully
Switzerland	The result of the interaction between the probability of occurrence and negative consequences for the population as well as its bases of existence	No mention of subjective elements	Qualitative and quantitative	Qualitative and quantitative. However, final score is quantitative	Limited extent
Poland	A combination of the consequences and likelihood of a given event	No mention of subjective elements	Qualitative, quantitative and software based	Qualitative	Moderate extent

Figure 9.2: Summary Table Second Main Point of Assessment

A main similarity can be found in the fact that none of the NRAs rely solely on quantitative methods in determining likelihood or consequences. Whilst this can already be seen as being in line with the normative framework, the NONRA takes the matter one step further by depending predominantly on qualitative methods instead. This represents another reason for this thesis to regard it as fully social-constructivist and thus in line with the normative framework. It addresses any possible methodological limitations related to a single method, qualitative approach by including experts from a wide range of

disciplines. Most of the other NRAs have addressed any methodological limitations by adopting the above qualitative and quantitative mixed method design. Looking at the scales used by the five NRAs when comparing the different risks to each other, the majority of underlying assumptions found in the five NRAs are similar in the sense that the NLNRA, SENRA and NONRA all use a mix of qualitative and quantitative scales. Though the Swiss also make use of them, they in the end translate all impact scales into quantitative, monetary units and are thus less in line with the normative framework as the above three NRAs. The PLNRA is the only assessment that makes use of fully qualitative scales and, consequently, is more in line with the aforementioned framework in this regard. The final column of figure 9.2 shows the eventual results for each of the NRAs. Both the SENRA and CHNRA are considered to be social-constructivist in their approach to the concept of risk to a limited extent, whilst the PLNRA is so to a moderate degree. The NONRA can be seen as fully social-constructivist in this regard and the NLNRA to a large extent.

In sum, a main difference in relation to this second point is that only the NLNRA and the NONRA explicitly recognise the subjective elements related to risk, though the majority of NRAs focus on likelihood instead of the more statistics related term of probability in their definition of risk. A main similarity is that none of the NRAs rely solely on quantitative methods in determining likelihood or consequences, with the NONRA even going as far as relying mostly on qualitative methods instead. Finally, concerning the scales used when comparing risks, the majority of underlying assumptions found in the five NRAs are similar in that they all use a mix of qualitative and quantitative scales. Based on the above, all NRAs can be seen as social-constructivist in their approach to risk to a different degree, except the SENRA and CHNRA who have only adopted such an approach to a limited extent.

9.3 - Comparing Assumptions: Taking Citizen Behaviour into Account

The third main point of assessment aimed to determine whether the five NRAs had taken into account the impact of citizen behaviour in the face of crises and disasters, based on the argument contained in the normative framework that this should be the case. The analysis specifically focussed on the question of whether citizen agency and with it the impact of their behaviour has been acknowledged in the different NRAs. Furthermore, it looked at whether it has been incorporated in the data used for their production. Figure 9.3 provides an overview of the main results of the discussion on this third point for each of the five NRAs.

Countries	Incorporated in Data	Acknowledgement Agency	Aligned?
The Netherlands	In historical data	No	No
Sweden	In historical data	No	No
Norway	Limited	No	No
Switzerland	In historical data	Recognised but not incorporated	No
Poland	In historical data	No	No

Figure 9.3: Summary Table Third Main Point of Assessment

The first column in the above figure shows whether or not the effects of citizen behaviour have been incorporated in the data used for the risk analyses and the second column whether it has been explicitly considered during these assessments by way of recognising citizen agency.

As can be seen in the figure, the results of the assessment for each of the NRAs are remarkably similar. Looking at the third column, one can state that the Swedish, Norwegian, Dutch and Polish NRAs do not, implicitly or explicitly, recognise citizen agency. In fact, only the CHNRA mentions citizen does recognises this, but then fails to incorporate it in the scenario analyses. However, it can be stated that all NRAs rely strongly on historical data in which the effects of citizen behaviour have probably already been incorporated, with the exception of Norway which only does so to a limited extent. Nonetheless, this ‘by accident’ taking into account of the impact of citizen behaviour does not represent sufficient ground for stating that the underlying assumptions of all five NRAs are in line with the normative framework, the more because not all scenarios can rely on historical data. This conclusion is reflected in the final column of the above figure. As a side note, it is especially striking that this is the case even for countries with a long tradition of citizen involvement in civil defence matters such as Switzerland or a high reliance on citizen self-dependency such as Norway. The next section will provide a conclusion to this chapter.

9.4 - Conclusion

This chapter has brought together and compared the results of the five case studies that have in turn examined as well as assessed the set of triggered mechanisms and resulting underlying assumptions found in each of the NRAs featured in this thesis. Consequently, this chapter has answered the following sub-question: *What are the main differences and similarities between the underlying assumptions found in the five risk assessments in terms of their alignment with the normative framework?* The answer to this question will be presented individually for each of the three points of assessment.

Concerning whether or not a comprehensive approach to national security has been adopted, the underlying assumptions of all NRAs are similar in having done so and, consequently, in adhering to the normative framework in this regard. A main difference can be found in the fact that only the NONRA has managed to include all interests in an equal manner, representing a stronger alignment than the four other NRAs. Furthermore, in relation to the inclusion of the subjects of cultural heritage and ecological stability large differences in terms of alignment exist with especially the NLNRA scoring relatively poorly. However, one final similarity is the fact that none of the NRAs with the possible exception of the SENRA have included the subject of the stability of the digital environment.

The second point asked to what extent a social-constructivist approach to risk has been adopted. Here, the underlying assumptions found in the five NRAs differ in their alignment with the normative framework on a few points. First, only the NLNRA and the NONRA explicitly recognise the subjective nature of risk. Second, only the PLNRA makes use of fully qualitative scales when comparing the different risks to each other and is thus more in line with the framework than the other four initiatives in this regard. The NLNRA, SENRA and NONRA make use of both qualitative and quantitative scales whilst the CHNRA translate all impact scales into monetary units. A main similarity is that none of the NRAs rely solely on quantitative methods in determining likelihood or consequences, with the NONRA even relying predominantly on qualitative methods instead. In terms of final results for each of the NRAs, both the SENRA and CHNRA are considered to be social-constructivist in their approach to the concept of risk to a limited extent seen from the normative framework and the PLNRA to a moderate degree. The NONRA is fully social-constructivist in this regard and the NLNRA to a large extent.

Section 9.3 on the third point concluded that the underlying assumptions found in all five NRAs are similar in that they do not take into account the impact of citizen behaviour to a degree that they can be seen as being in line with the normative framework. The only notable difference between them can be found in the fact that the CHNRA document explicitly recognizes citizen agency. Nonetheless, it still does not take this into account in the analysis. The next and final chapter will provide a conclusion to this thesis.

10 - Conclusion, Recommendations and Discussion

The previous chapters have all contributed to this thesis by providing the information necessary to answer its main research question. Chapter two has explained the theoretical basis of the normative framework used to structure the discussion on underlying assumptions in the case studies. Following this, chapter three discussed the general properties one can expect to find in a NRA and chapters four to eight featured the five case studies on underlying assumptions. Finally, chapter nine has combined the results of the assessments from the five country cases and compared them. Based on the above, section one of this chapter can now provide an answer to the main research question of this thesis. This will be followed by an overview of recommendations for future version of the NLNRA in section two, based on these conclusions. Finally, section three will feature a more general discussion on the limitations and results of this thesis as well as possible areas for future research.

10.1 - Conclusion

The aim of this thesis has been to answer the following question: How does the quality of the underlying assumptions used in the production of the NLNRA compare to that of European counterparts? In order to answer it, this research has assessed and compared the NLNRA to the Swedish, Norwegian, Swiss and Polish NRAs on three main points concerning these underlying assumptions in light of the normative framework as adopted by this thesis. With the aim of providing a clear structure to this conclusion, the above question will first be answered separately for each of these three points before presenting an overall conclusion.

The first point of comparison on whether a NRA has adopted a comprehensive view on risk and security consisted of two parts. The more general part asked if other interests than sovereignty have been taken into account and whether these have been included in an equal manner relative to each other. The second part examined if the specific subjects of cultural heritage, ecological stability and the stability of the digital environment have been included. Based on the previous chapters, the quality of the underlying assumptions used in the production of the NLNRA can be seen as comparable to that of most European counterparts concerning the first part. This is the case to the extent that other interests than sovereignty have been included, but also to the degree that the NLNRA has not managed to include all national interest in an equal manner relative to each other as well. However, the NLNRA scores relatively poorly when looking at the inclusion of the three subjects of special interest. In fact, when looking at figure 9.1, one can see that it finishes in fifth place in terms of including them. The relatively

low score related on this latter part ensures that in terms of this first point of assessment, the quality of the underlying assumptions found in the NLNRA can be seen as slightly lower than that of most of the four European counterparts when approached from the normative framework. Whilst at first sight this may appear to be somewhat worrying, one has to be aware of the fact the NLNRA is being compared to a number of the most advanced European NRAs. The case selection process of this thesis as explained in section three of the introduction, with a focus on well-developed comparative NRAs, ensures that only 'top tier' documents have been included in the evaluation. Thus, even though the NLNRA may score relatively low within this top tier concerning the first point of assessment, it can still be seen as belonging to it. Furthermore and as explained in chapter two, the selection of the above three subjects of special interests has been partially based on a request to do so by the ANV. This request originated from the view that there was still room for the NLNRA to improve in relation to their inclusion. Whilst this view turned out to be correct, the above request has resulted in a situation where it was to be expected that the NLNRA would score relatively low as compared to when other subjects had been considered.

The second point of assessment examined to what extent a social-constructivist approach to risk has been adopted by the NRAs. It was mentioned in chapter nine that, following the NONRA, the NLNRA can be seen as the most social-constructivist of all five NRAs. Here, the main difference between the two can be found that the NONRA has fully embraced risk as a subjective concept, whilst the NLNRA only does so partially. Nevertheless, the quality of the underlying assumptions found in the NLNRA can still be regarded as high in relation to this second point of assessment when compared to that of most of the other European counterparts featured in this thesis. In general it can be stated that the majority of NRAs still adhere to a predominantly classical approach to risk or have only partially adopted social-constructivism. Thus, in the debate on approaching risk, the classical camp is still on the winning hand.

Turning to the third point of assessment, on whether the five NRAs had taken into account the impact of citizen behaviour in the face of crises and disasters, this concluding section can be very brief. Chapter nine concluded that none of the five NRAs adhered to the normative framework and that only minor differences exist between them concerning this third point. One of these differences could be found in the CHNRA's acknowledgement of citizen agency, despite the fact that it did not take this into account in the actual scenario analyses. Consequently, the quality of the underlying assumptions found in the NLNRA is similar to that of its four peers. Of course, in relation to the normative framework the five NRAs are still poorly aligned, but relatively speaking they are all similar to each other.

In sum, the overall conclusion of this thesis is that the quality of the underlying assumptions found in the NLNRA is similar to that of its four European counterparts concerning the three main points on which they have been assessed. This conclusion is based on the average of the results for each of these three points featured above, with the quality of the underlying assumptions found in the NLNRA being relatively low, high and similar for the first, second and third point of assessment, respectively. The above conclusion has been based on this average score because it is not up to the author to determine which of the points should be considered as more important than its two peers in the production of a NRA. Of course, the reservation should be made that this conclusion is only based on an analysis of the three points of assessment contained in this thesis. If other points or other countries had been selected, the above conclusion could have very well been different. Nevertheless, as the quality of the underlying assumptions found in the NLNRA is similar to that of other well-developed, comparative assessments, this thesis argues that it can still be seen as one of the best available European examples of a NRA. In general, this research has shown that each of the five NRAs have different strengths and weaknesses. For instance, whilst the NLNRA outclasses the CHNRA in terms of adopting a social-constructivist approach, it can still learn something from the way the Swiss have incorporated the subjects of cultural heritage. Viewed from the perspective of CMO model, this specific set of strengths and weaknesses found in each of the five NRAs can be seen a reflection of the context within which they are produced. Whilst in some countries policymakers or society in general might attribute a high value to the inclusion of a certain topics, they might be less important in others. These differences in terms of context in turn result in the triggering of different underlying assumptions in the production of a NRA and in the accompanying set of strengths and weaknesses found in each of the five NRAs. The next section will examine what can be learned from the different strengths and weaknesses of the five NRAs for the 2020 version of the NLNRA.

10.2 - Recommendations

As stated before, the overall purpose of this thesis is to evaluate the current NLNRA and to produce recommendation for future versions. Having answered the main research question on the quality of the underlying assumptions found in the NLNRA in the previous section, this part will focus on what can be learned from the differences and similarities in relation to European counterparts. A number of recommendations can be formulated concerning each of the three points of assessment taking into account the comparison with European counterparts as well as the normative framework.

Starting with the first point, it was stated in the previous section that the NLNRA is comparable to its peers in, amongst other things, not including the different national interests in an equal manner. The country case study on the NLNRA argued this was due to an unequal distribution of indicator amongst them. Consequently, a **first recommendation** would be that in order to ensure a truly equal inclusion of all the national interests considered in the Dutch assessment, the impact criteria need to be more evenly distributed amongst them. This especially concerns the national interest of ecological stability. By doing so, interests other than sovereignty are not only included, but included in an equal manner relative to each other, as is currently already the case in the document produced by the Norwegians. A **second recommendation** is that the subject of cultural heritage needs to be properly included. Next to the importance of the subject as discussed in chapter two, the NLNRA will in addition remain somewhat of an exception in relation to its European counterparts if it continues not to do so. The relative quality of its underlying assumptions in relation to the inclusion of the subjects of special interests could be greatly improved by including cultural heritage. Here, the ANV could opt to, metaphorically speaking, kill two birds with one stone by following the Norwegian example. In the NONRA, the national interest covering the environment not only features an indicator related to the natural, but also one to the cultural environment (see figure 6.1). It is the recommendation of this thesis for the ANV to also add a similar indicator related to the cultural environment to the national interest of ecological stability, potentially requiring a slight change in its name to 'environment'. This way, both the unequal distribution of indicators as well as the absence of the subject of cultural heritage is addressed simultaneously. For the contents and underlying scoring mechanism related to this cultural heritage indicator, the ANV could benefit from looking at the way the matter has been approached in the CHNRA (OFPP, 2013, p.21). Finally, chapter nine mentioned that none of the NRAs with the exception of Sweden have included the subject of the stability of the digital environment. However, as the ANV is currently still producing the underlying mechanisms related to the part of indicator 1.1 covering this subject and the other NRAs have mostly not featured it either, no recommendation can be made concerning this item except for a call to properly include it in the 2020 NLNRA.

Turning to the second point, this research would like to propagate two interrelated recommendations even though it simultaneously recognises that the NLNRA already can be seen as social-constructivist to a large extent. First of all, even though the NLNRA acknowledges the concept of risk as being partially subjective, this statement has not yet been operationalised to the same extent as the simultaneous recognition of the NLNRA that risk is also objective. Whilst a mix of qualitative and quantitative methods and scales related to the different indicators are used, the latter type still

represents the dominant *modus operandi*. Consequently, the **third recommendation** of this thesis would be to ensure that what is said in the NLNRA chapters covering methodology and the concept of risk are not just meant to check a box showing the ANV has taken account of the discussion surrounding the best way to approach or define risk, but that their conclusions are reflected throughout the entire analysis and methodology as is the case in the Norwegian analysis. The **fourth recommendation** is closely related to the third and can be seen as one of the possible ways of achieving it. Currently, qualitative impact scales are only truly used in relation to some of the indicators covering the national interest of social and political stability. This thesis argues that the ANV should take inspiration from the PLNRA and include more qualitatively determined scales, covering other national interests as well. There are two specific areas where this could easily be incorporated. First of all, as stated before, the ANV is still in the process of defining the underlying mechanisms related to the part of indicator 1.1 on the subject of the stability of the digital environment. Instead of adopting a quantitative approach focusing on for instance the percentage of vital IT systems being affected and subsequently working with numerical scales, these could be based on a more descriptive categorization. Thus, rather than defining for instance the highest impact scale as ‘more than 70 percent of critical IT systems will be out of order for over 30 days’, a more descriptive definition could be adopted such as ‘a majority of critical IT systems is expected to be out of order for a prolonged period of time’. The second area is the indicator covering cultural heritage as proposed in the previous section, for which an example of comprehensive qualitative scales can be found in the CHNRA.

In relation to the final point, this research again has two recommendations for the ANV. First, representing the **fifth recommendation** of this thesis, citizen behaviour and citizen agency needs to at least be explicitly acknowledged in the Dutch risk assessment, similar to the CHNRA. As argued in chapter two, this behaviour can have a substantial impact on the consequences of a crisis or disaster. Recognising this potential is the first step towards incorporating it in the analysis. A suggestion is to, for each risk category, describe the expected degree of citizen self-reliance as well as expected behaviour in the already existing analysis on current capabilities. This way, users of the NLNRA are at least made aware of it and can bear in mind this information when looking at the different scenarios. Of course this does not yet represent a full taking into account of the impact of citizen behaviour in the actual analysis. However, recognising the complexity of incorporating citizen behaviour as well as the fact that none of the four European counterparts can provide any guidance, this is probably the most feasible option for the 2020 ANV. Even including this limited analysis will make the NLNRA one of the forerunners in this

regard. In the long term, though, the **sixth recommendation** of this thesis is to develop a proper methodology for the inclusion of the impact of citizen behaviour in the impact analyses themselves.

Next to the above six recommendations based on the three main points of assessment and the underlying theory-based normative framework, this thesis would like to make one final proposition, not necessarily based on theoretical insights. As could be seen in the final column of figure 3.7, the Netherlands and Switzerland are the only two countries where there are no strong links between national and regional or local risk assessment exercises. Thus, the Netherlands finds itself on more or less the same level as a highly decentralised federal state when it concerns the dialogue and interplay between the various government levels in the area of conducting risk assessments. Even though the discussion on main properties in chapter three did not feature a normative framework based on which one could determine whether or not this is a good or a bad thing, there is a certain logic to basing a NRA on regional or local input. It is safe to assume that the 25 Dutch safety regions probably have a better understanding of the situation as well as safety and security risks in their respective territories than the national agencies tasked with the production of the NLNRA, at least when it concerns more traditional risks not requiring scarce, highly specialised knowledge. Using this local knowledge for the production of the NRA, as is the case in Sweden and Poland, may very well benefit the accuracy of its results. In turn, regional initiatives could take advantage of the findings contained in the NRA as is the case in Norway and especially related to those topics where regional knowledge may be lacking. This is certainly an area where the ANV still has a lot of work to do when compared to its European peers. Consequently, the **final recommendation** of this research is for the ANV to work on a stronger relation and more exchange with the 25 safety regions. Figure 10.1 below provides a small overview of the above seven recommendations in random order. The next section will continue with a more general reflection on this thesis

Recommendations
1. Create a separate impact criterion covering cultural heritage.
2. Ensure a more equal distribution of criteria in relation to the five national interests.
3. Recognise the subjective nature of risk throughout the analysis.
4. Make more use of qualitative impact scales, not just for indicators on social and political stability.
5. Explicitly recognise citizen behaviour and self-reliance in the discussion on current capabilities
6. In the long term, develop a methodology for the inclusion of the impact of citizen behaviour
7. Work on a stronger relation with and more exchange between regional and national initiatives.

Figure 10.1: List of Recommendations

10.3 - Discussion

Even though the previous nine chapters have occupied themselves with the different elements of this research, from the theoretical foundations of the normative framework to a case study on the underlying assumptions of the PLNRA, there are still a number of general points that have to be made related to this research. Despite the fact that they will not be taken into account in the above conclusion, they may help to put the results of this thesis in a broader perspective.

To start with, this research has a number of limitations. One of them being that this thesis has chosen to only focus on those NRAs which are somewhat comparable to the NLNRA by design. In practice this has meant that only European counterparts have been considered, despite the fact that the topic of national risk assessments is by no means a European one. In the Americas, both Canada and the U.S. have for instance developed all-hazard risk assessment methodologies (Department of Homeland Security, 2015; Public Safety Canada, 2012). Other examples can be found in initiatives undertaken by the South African and Australian governments (Australian institute for Disaster resilience, 2015; South African National Disaster Management Centre, 2016). Whilst the choice to focus on European counterparts has been made based both on practical reasons and the wish from the part of the ANV to further refine their methodology instead of initiating a complete overhaul, it does not mean that there is nothing of value to be learned from the above initiatives in the Americas, Africa or the Pacific region. On the contrary, comparing the NLNRA with counterparts made from non-European perspective on the function, shape and content of risk assessments may prove to be educational as well, making for an interesting topic for future research. However, a major obstacle to this future line of research will be the often classified nature of the documents in question. States are often still reluctant to share discussions on the topics of risk and security. A second limitation is that this research has only compared the different NRAs on a limited amount of points. As one can infer from the previous chapters, risk assessments can be complex documents, containing many different elements and a wide range of underlying assumptions on which specific choices have been made. This thesis has only managed to discuss three of these elements in depth. Even though these three aspects can be seen as some of the key determinants of both the content and utility of a NRA, it does not mean they represent an exhaustive list in this regard. An interesting element to explore further would for instance be the underlying assumptions behind the decision on which scenarios to contain in the national risk assessment and which ones to leave out or to delegate to similar regional or even local initiatives. Another element not touched upon to a large extent by this research, yet interesting for any future endeavors on the topic of NRAs is the way in which current developments or trends such as climate

change or demographic development have been incorporated and what underlying assumptions have been triggered in relation to them. A third limitation is that whilst this thesis has highlighted a number of differences and similarities, it has to a lesser extent provided an explanation for them. Put differently, it has argued that seen from the CMO model, different contexts result in different outcomes, but it, for example, has not explained why the Norwegians have adopted a fully social-constructivist approach to risk, but the Swedes have not. Even though a study on underlying factors of societal differences towards subjects such as risk perception is beyond the scope of this thesis and more related to the fields of ethnography, anthropology and sociology, this does not imply that it is not worth researching.

Another concluding remark refers to the fact that this thesis has not truly questioned or examined the societal value of a risk assessment as produced in its current form in for instance the Netherlands. Someone who has done so in his own research is Charles Vlek. Amongst other things, he argues that the current way in which expert assessment is used in the production of the NLNRA can negatively impact the document's perceived value as an objective foundation for policy decisions. The author states that even though experts from a wide range of disciplines are consulted, there is still a lack of independent external validation when it concerns the conclusion they reach (Vlek, 2013, p.965). Stated differently, the use of expert assessments in the NLNRA remains somewhat of a black box, possibly making it harder for politicians to rely on as they do not always know the reasoning behind certain outcomes contained in the document. Whilst it is beyond the scope of this research to suggest how the ANV may increase the transparency of expert judgements and whether this is at all desirable, taking into account the possibly sensitive nature of the discussions, it is something the ANV should at least award some attention in preparation for the 2020 NLNRA.

At this point, one final comment needs to be made on a more personal note from the perspective of the author. Whilst reviewing the different NRAs and accompanying publications, it was striking to see how little exchange of ideas and information there has been between the five initiatives discussed in this research. Despite that fact that all countries have close ties to each other by way of geographical and cultural proximity as well as formal and informal collaboration via EU civil protection mechanisms, this exchange has been minimal at best. Even the initiative by the European Commission aimed at harmonizing and promoting the development of NRAs has been, metaphorically speaking, put on ice somewhere in a Brussels office. No major related EU publications or decisions have been published in the past couple of years and, as seen in chapter four, only the SENRA has truly taken the initiative into account. This has resulted in a situation where everyone is trying to invent the wheel simultaneously but separately instead of learning from each other's successes and failures. This is the

case for the development of a national methodology as well as for the assessment of cross-border risks. A nuclear accident in the Netherlands may have substantial effects for the entire European region and vice versa, yet the five NRAs provide no indication that this kind of cross-border threat has been the subject of collaboration across those same borders. Yes, the topic of risk and security can be a sensitive one and individual countries may not be excited with the idea of exposing the most prominent risks that have to be faced by their respective societies to their immediate neighbor and potential past, present or future adversaries. Nonetheless, what is to stop them from at least sharing ideas about underlying methodological issues and overcoming obstacles together? Is it truly vital to national security for Sweden to keep the way they approach expert assessment a secret from the Poles or the Swiss? Will it be detrimental to Norwegian national security to sit down with the members of the Dutch ANV and discuss protection of cultural heritage? Probably not. In the opinion of this author, the true obstacle has been a reluctance of the different agencies involved in the production of an NRA as well as the associated political actors to take the first step towards engaging in meaningful engagement and cooperation with their peers. Consequently, a final recommendation for the ANV would be to try and take this first step and reach out to European and non-European counterparts. As mentioned in the introduction, we all face risks in some way or another, be it at an individual or societal level. It should however be added that whilst facing them together will not make them disappear, it will certainly increase our ability to cope with them.

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Attachment 1 – Overview of National Risk Assessments Produced by 31 European Countries

The table below features a compilation of national risk assessments as produced by the 28 EU member states as well as Norway, Switzerland and Iceland. The different countries are discussed in alphabetical order, focusing on the availability, name and type of the respective assessments as well as whether they are suitable to be included in the comparison conducted by this thesis. The criteria for this inclusion can be found in the methodology section in the introduction of this research. Where needed, clarification is provided in the far right column. When the table indicates that there is “No evidence for existence”, this does not necessarily mean that the country in question did not produce a risk assessment at all. It merely indicates that the researcher was not able to find it. This can be due to language problems, the document in question being classified or, indeed, the document not existing.

Country	Available	Name	Type	Suitable	Clarification
Austria	No, only on a municipal level	N/A	N/A	N/A	The terms risk', 'threat' and '(national) security' in combination with 'assessment', 'profile' or 'analysis' did not yield any relevant results concerning risk assessments performed at the national level. The websites of the Ministry of Defence and the Ministry of the Interior have been consulted. A query on internet search engines also did not lead to any results.
Belgium	No evidence for existence	N/A	N/A	N/A	The terms 'risk/risico', 'threat/dreigingen' and '(national) security/(nationale veiligheid)' in combination with 'assessment/evaluatie', 'profile/profiel' or 'analysis/analyse' did not yield any relevant results, neither in English nor Dutch. The websites of the Ministry of the Interior, the Ministry of Defence and the <i>Directie Civiele Veiligheid</i> were consulted.
Bulgaria	No evidence for existence	N/A	N/A	N/A	The terms risk', 'threat' and '(national) security' in combination with 'assessment', 'profile' or 'analysis' did not yield

Country	Available	Name	Type	Suitable	Clarification
					any relevant results. The websites of the Ministry of Defence and the Ministry of the Interior have been consulted. A query on internet search engines also did not lead to any results.
Croatia	Yes, but some parts are not accessible	Procjena Nacionalnog Rizika	Comparative	No	Written in Croatian. Language not mastered by the researcher and access problems.
Cyprus	No evidence for existence	N/A	N/A	N/A	The terms risk', 'threat' and '(national) security' in combination with 'assessment', 'profile' or 'analysis' did not yield any relevant results. The websites of the Ministry of Defence, the Ministry of the Interior and the Ministry of Justice and Public Order have been consulted. A query on internet search engines also did not lead to any results.
Czech Republic	No evidence for existence	N/A	N/A	N/A	A publication that comes relatively close to being a risk assessment is the <i>Security Strategy of the Czech Republic</i> (edition 2011). However, this documents focusses almost exclusively on military matters and does not present a comparative analysis of different risks. The terms risk', 'threat' and '(national) security' in combination with 'assessment', 'profile' or 'analysis' did not yield any further relevant results. The websites of the Ministry of Defence and the Ministry of the Interior have been consulted. A query on internet search engines also did not lead to any results.
Denmark	Yes	National Risk Profile (2013)	Comparative	Yes	
Estonia	Yes, but	National	Unclear	No	Language not mastered by the

Country	Available	Name	Type	Suitable	Clarification
	only in Estonian	Emergency Risk Assessment			researcher.
Finland	Yes	National Risk Assessment 2015	Comparative	Yes	
France	Yes	White Paper on Defence and National Security (2013)	Enumerative	No	The document is a white paper that describes a number of threats and developments concerning national security. It does not put these developments in a comparative perspective.
Germany	No evidence for existence	N/A	N/A	N/A	In Germany, civil protection initiatives are conducted at the lowest possible level of government. Consequently, guidelines on how to conduct a risk assessment exercise have been produced by the national government, but they have not been implemented at a federal or provincial (Bundesländer) level. The terms risk', 'threat' and '(national) security' in combination with 'assessment', 'profile' or 'analysis' did not yield any relevant results at federal or provincial level. Both the websites of the ministry of Internal affairs and the Civil Defense Agency (BBK) as well as the websites of the provincial governments of Saxony and Nordrhein-Westfalen were consulted.
Greece	No evidence for existence	N/A	N/A	N/A	The terms risk', 'threat' and '(national) security' in combination with 'assessment', 'profile' or 'analysis' did not yield any relevant results. The websites of the Ministry of Defense, the Ministry of the Interior and the General Secretariat for Civil Protection have been consulted. A query on internet search engines also did

Country	Available	Name	Type	Suitable	Clarification
					not lead to any results.
Hungary	No evidence for existence	N/A	N/A	N/A	The <i>National Security Strategy of the Republic of Hungary</i> is the only document that occupies itself with risks that threaten Hungarian society. The document is however very short (16 pages) and focusses mainly on geopolitical threats. It does not feature any comparative analysis. The terms risk', 'threat' and '(national) security' in combination with 'assessment', 'profile' or 'analysis' did not yield any further relevant results. The websites of the Ministry of Defence and the Ministry of the Interior have been consulted. A query on internet search engines also did not lead to any results.
Iceland	Yes, but only an executive summary is publicly available	National risk Assessment for Iceland (2008-2011)	Comparative	No	Next to the fact that the document is already more than eight years old, only limited information can be found in the executive summary which is publicly available online. The full document cannot be retrieved via the responsible government agency (Iceland Department of Civil Protection and Emergency Management) or via internet search engines.
Ireland	Yes	National risk Assessment for Ireland	Enumerative	No	The most recent assessments (2015 and 2016) do no longer contain a comparative analysis, but only consist of an enumeration of the different risks that face Irish society. Earlier versions (for instance 2012) did contain this comparative element.
Italy	No evidence for existence	N/A	N/A	N/A	The terms risk', 'threat' and '(national) security' in combination with 'assessment', 'profile' or 'analysis' did not yield any relevant results. The

Country	Available	Name	Type	Suitable	Clarification
					websites of the Ministry of Defence, the Ministry of the Interior and the department of civil defence (Protezione Civile) have been consulted. A query on internet search engines also did not lead to any results.
Latvia	No evidence for existence	N/A	N/A	N/A	The terms risk', 'threat' and '(national) security' in combination with 'assessment', 'profile' or 'analysis' did not yield any relevant results. The websites of the Ministry of Defence and the Ministry of the Interior have been consulted. A query on internet search engines also did not lead to any results.
Lithuania	Yes	National Threat Assessment (2016)	Enumerative	No	Extensive enumeration of different risks, but does not contain a comparative analysis.
Luxemburg	No evidence for existence	N/A	N/A	N/A	The terms 'risk/risques', 'threat/menaces' and '(national) security/sécurité (nationale)' in combination with 'assessment/évaluation', 'profile/profil' or 'analysis/analyse' did not yield any relevant results, neither in English nor French. Consulted was the 'Portail des Secours' of the Luxemburg government as well as internet search engines.
Malta	Exists, but not accessible	Malta National Risk Assessment	Comparative	No	An extensive search on the websites of both the responsible government agency (MaltaCIP) as well as the company that conducted the assessment (Epsilon) did not result in the retrieval of the document. A query for "Malta National Risk Assessment" on internet search engines was not successful either. The only available document is a peer review by the EU.

Country	Available	Name	Type	Suitable	Clarification
Netherlands	Yes	Nationaal Veiligheidsprofiel (2016)	Comparative	Yes	
Norway	Yes	National Risk Analysis 2014	Comparative	Yes	
Poland	Yes, but restricted access	National Risk Assessment (2015)	Comparative	Yes	A peer review conducted under the auspices of the EU is also available.
Portugal	Exists, but not accessible	National Risk Assessment	Comparative	No	The English language version of the website of the responsible government agency (the Portuguese National authority for Civil Protection) has very limited functionalities. The document could not be retrieved. An additional query via internet search engines also yielded no relevant results, using the terms 'risk', 'threat' and '(national) security' in combination with 'assessment', 'profile' or 'analysis'.
Romania	No, only an extensive progress report is available (in English)	Unclear	Comparative	No	Despite the relatively extensive progress report produced by the Romanian government for the European Commission, many other documents are either in Romanian or not publicly available. A search using the terms 'risk', 'threat' and '(national) security' in combination with 'assessment', 'profile' or 'analysis' on the website of the responsible ministry, the Ministry of the Interior, did not yield any relevant documents. Internet search engines have also been consulted using the same terms. No relevant result were found.
Slovakia	Evidence that the document exists, but	Possibly: 'Analysis of a district territory	Unclear	No	The website of the responsible government agency, the Ministry of the Interior, has only been partially translated into English.

Country	Available	Name	Type	Suitable	Clarification
	not retrievable	according to the occurrence of possible emergencies'			An extensive search on internet search engines using the terms 'risk', 'threat' and '(national) security' in combination with 'assessment', 'profile' or 'analysis' did not yield any relevant results (in English).
Slovenia	Exists, but not accessible	National disaster Risk Assessment (2015)	Comparative	No	A relatively short, summarizing report comparing all the different risks is available. However, all scenarios and additional information on the risks in question is contained in separate documents, produced by the different responsible ministries. These documents are not retrievable (in English) via the websites of these ministries or queries on online search engines.
Spain	Yes	Part of the National security Strategy (2013)	Enumerative	No	Has a length of only several pages and does not feature any explanation on methodology.
Sweden	Yes	Swedish National risk assessment (2012)	Comparative	Yes	
Switzerland	Yes, in French	Analyse nationale des dangers représentés par les catastrophes et situations d'urgence	Comparative	Yes	
United Kingdom	Yes, but some parts are not publicly available	National Risk Assessment 2015	Comparative	Yes	A declassified and edited version for civilians is publicly available under the name National risk Register. The National risk assessment is considered classified information.

Attachment 2 - Overview of Scenarios Contained in the Five Risk Assessments

The table below presents an overview of all the scenarios contained in the different risk assessments discussed in this thesis. Where applicable, overarching risk themes and risk categories are also mentioned. The table only contains those scenarios that have been fully analysed in the different risk assessments according to their respective methodologies. Some of the NRA's such as the SENRA or NLNRA also mention a number of scenarios without scoring them according to their methodological framework. These have not been included in the list.

Country	Category	Sub-division	Scenario
The Netherlands	Natural disasters	Flooding	- Flood (river) - Flood - severe (sea)
		Extreme weather	- Snow storm
		Draught and heat	- N/A
		Wildfires	- Wildfire
		Earthquakes	- Earthquake (natural) - Earthquake – severe (gas extraction)
		Solar storm	- N/A
	Threats to health and the environment	Environmental disasters	- N/A
		Food crises	- N/A
		Anti-microbial resistance	- N/A
		Animal diseases and zoonosis	- Animal Disease (Foot-and-Mouth Disease) - Zoonosis outbreak (AI)
		Human communicable diseases	- Influenza pandemic (mild) - Influenza pandemic (severe)
	Major accidents	Radiological accidents	- Nuclear disaster (Europe) - Nuclear disaster (Netherlands)
		Chemical incidents	- Chemical accident (industry) - Chemical accident (transport)
		Transportation accidents	- N/A
	Disruption critical infrastructure	Independent disruptions of vital processes	- Disruption of power supply - Satellite disruption
		Disruption of multiple processes due to common causes	- N/A

Country	Category	Sub-division	Scenario
	Cyber threats	Disruption of multiple processes due to chain effects	- Cascading effects of power supply failure
		Digital sabotage	- Cyber attack - disruption critical infrastructure
		Disruption of the internet	- Disruption of internet
		Cyberespionage	- Cyberespionage government
	Subversion, extremism and terrorism	Cybercrime	- N/A
		Large scale public disturbances	- N/A
		Subversion of the democratic constitutional state and open society	- Subversion foreign actors - Subversive enclaves
	Geopolitical threats	Extremism and Terrorism	- Violent loner - Multiple terrorist attack
		Shifts of power in the international arena	- N/A
		Increasing tension between major powers	- International conflict
	Financial-economic threats	Scarcity of natural resources	- Oil geopolitics
		Destabilisation of the financial system	- Destabilisation financial system
		Cybercrime in the financial sector	- Cyberattack financial system
Sweden	Natural hazards	N/A	- Criminal foreign concern - Criminal subversion of critical business - severe
			- Earthquake and volcanic eruption - Mudslide - Heat-wave - Pandemic flu - Solar storm
			- Fire on cruise ship - Nuclear accident - Dam failure
	Disruption to technical infrastructure and supply systems	N/A	- Disruption in GNSS - Disruptions in food supply - Diesel in the supply of drinking water

Country	Category	Sub-division	Scenario
Norway	Antagonistic hazards	N/A	- Bomb attack
			- School shooting
			- Violent disturbances
	Natural events	Extreme weather	- Storm in inner Oslo Fjord - Long-term power rationing
		Flooding	- Flooding in eastern Norway
		Landslides and avalanches	- Rockslide at Åkneset with advance warning - Quick clay landslide in a city
		Infectious diseases	- Pandemic in Norway
		Forest and wilderness fires	- Three simultaneous forest fires
		Space weather	- 100-year solar storm
		Volcanic activity	- Long-term volcanic eruption in Iceland
		Earthquake	- Earthquake in a city
	Major accidents	Hazardous substances	- Gas emission from an industrial plant - Fire at an oil terminal in a city
		Nuclear accidents	- Nuclear Accident at a Reprocessing Plant
		Offshore accidents	- Oil and gas blowout on a drilling rig
		Transport accidents	- Collision at sea off the coast of western Norway - Tunnel fire
	Malicious acts	Terrorism	- Terrorist attack in a city
		Security policy crises	- Strategic attack
		Cyberspace	- Cyber-attack on financial infrastructure - Cyber-attack on electronic communications infrastructure
Poland	Natural Hazards	N/A	- Floods (1) - Forest fires (2) - Epidemics (3) - Epizootics (4)
	Civilisation hazards	N/A	- Disruption of electricity supplies (5) - Disruption of fuel supplies (6) - Disruption of gas supplies (7) - Chemical contamination (8) - Radioactive contamination (9) - Disruption of telecommunication systems (10) - Social protests (11) - Threats to public buildings (N/A)
	Threats caused by intentional human activities	N/A	- Classified

Country	Category	Sub-division	Scenario
	Threats of a terrorist nature which may lead to an emergency	N/A	- Classified
	Political and military	N/A	- Classified
Switzerland	Dangers of a Natural origin	N/A	<ul style="list-style-type: none"> - Storm - Flooding - Blizzard - Bad weather, thunderstorms - Cold wave - Heat wave - Forest fire - Drought - Earthquake (seismic) - Meteor shower - Solar storm - Large scale spreading of invasive species
	Dangers of a technological origin	N/A	<ul style="list-style-type: none"> - Aircraft or satellite crash - Rail accident with dangerous substances - Road accident with dangerous substances - Accident at a nuclear installation - Accident at a type B installation (biological) - Major accident at a type C installation (chemical) - Dam failure - Disruption of the electricity network - Disruption gas distribution network - Disruption of ICT infrastructure - Obstacles to inland navigation
	Dangers of a societal origin		<ul style="list-style-type: none"> - Epidemic, pandemic - Epizootic - Failure of electricity supply (long term) - Terrorist attack (conventional) - Terrorist attack (nuclear/radiological) - Terrorist attack (biological) - Terrorist attack (chemical) - Cyberattack - Influx of refugees - Violent disturbances

Attachment 3 - Interview Questions

The figure below contains the questions (in Dutch) posed during the interview on the NLNRA concerning its contents, origins and background with a key figure involved in the production of both the current and some of the previous editions of the document as well as the underlying methodology. The interview was semi-structured, meaning that for some of the questions in the table a number of follow-up questions were asked. It lasted for around 45 minutes and was conducted at the Dutch National Institute for Public Health and the Environment. The questions were formulated after a thorough analysis of the NLNRA and associated documents and are aimed at clarifying areas that remained unclear or concerning which there was little information to be found.

No.	Question
1	The NLNRA state that risk is a multi-dimensional concept with which one can perform objective calculations, but which simultaneously is also a more subjective, social construct. How has this latter dimension been incorporated in analysing the different risks?
2	Dutch and international research (i.e. the Dutch Institute of Physical Safety and Crisislab) has shown that citizens often act both adequately and constructively during as well as immediately after an accident or disaster. Not only looking after themselves, but also taking care of others. This degree of self-sufficiency has a potentially large dampening effect on the eventual impact of a risk when the latter materialises. Has the ANV in any way taken the behaviour of citizens into account when producing the NLNRA?
3	Has the ANV ever considered to, next to the organisations which are currently involve also involve citizens in the production of the NLNRA?
4	The NLNRA is a publicly available document, but has civil servants and policy makers as its main target audience. Has the ANV ever considered to, as is the case in the UK, produce a version of the NLNRA specifically targeting citizens?
5	In the NLNRA, the impact of different risks on the five national security interests as described in the national safety and security strategy is determined. Has the ANV considered adding other interests to this list?
6	Cultural heritage is of major societal importance, but also potentially vulnerable in relation to risks of both a malicious and non-malicious nature. Has the topic of cultural heritage ever been discussed and, if so, why has it not been explicitly included in the NLNRA?
7	Nowadays, the stability of the digital environment is crucial for the proper functioning of society. So far, however, the impact criterion related to this subject (part of criterion 1.1) has not been fully developed. How precisely does the ANV aim to include this subject in the NLNRA?
8	Do each of the impact criteria, when applicable, get awarded the same influence on the determination of the overall impact score of a scenario?

9	Do national interests with multiple criteria, such as social and political stability, have a larger influence on the eventual impact score of a scenario than those with only one criterion such as ecological security?
10	In 2010 the European Commission published several guidelines for conducting a national risk analysis (Risk Assessment and Mapping Guidelines for Disaster Management). To what extent has the ANV been inspired by EU initiatives such as this?
11	How much interaction and exchange of ideas has there been with other (European) countries during the production of the NLNRA and has this influenced the work of the ANV?
12	Why was the choice made not to incorporate the capability analysis in the NLNRA?
13	Who is responsible for the production of this capability analysis?
14	Why was the choice made to attribute a very specific point to each of the risks in the risk diagram, instead of a more general bandwidth in relation to their impact and likelihood as is the case in the Swedish assessment?
15	To what extent is it the intention that the different safety regions base their methods and scenarios on the NLNRA?
16	Which guidance will be offered by the ANV to the different safety regions and related organisations concerning the creation of regional risk assessments?
17	Is there any feedback of findings from the regional risk assessments back to the ANV with the aim of further developing the NLNRA?

Attachment 4 - Questionnaire

The table below features the questions contained in the questionnaire that was sent to the Polish Government Centre for Security (RCB). The questions have been formulated following a thorough analysis of the PLNRA and associated documents and are aimed at clarifying areas that remained unclear or concerning which there was a lack of information. Consequently, they cover a variety of topics related to the PLNRA.

No.	Question
1	In the Polish NRA, risk is calculated on the basis of likelihood and consequences. The scales that are used in order to determine both elements are of a rather qualitative, descriptive nature, especially when looking at consequences. Why has this more qualitative approach, avoiding rigid scales (10-100, 100-1000 casualties, etc.) been chosen for the Polish NRA?
2	Have more subjective elements related to the concept of risk, such as risk perception also been incorporated in the Polish NRA?
3	In the Polish risk assessment, the acceptance of risks is included. Is the indicated level of acceptance purely based on the estimates of the different government agencies or have the opinions of citizens also been taken into account?
4	Research has shown that citizens can have a large effect on the eventual impact of a disaster/event. They often react in a relatively rational manner when confronted with danger and can play an important role in (initial) search and rescue activities as well as medical care. This way the potential amount of, for instance, fatalities can be reduced. Has this potential impact of citizen behaviour been incorporated in any way in the Polish NRA?
5	Have citizens in any way been involved in the production of the Polish NRA?
6	The actual Report on threats to National security is a classified document. Is there/will there ever be an adjusted version of the document specifically aimed at Polish citizens, for example informing them about risks in their areas and what they can do to help?
7	In the summary document of the Report on Threats to National Security, three impact areas of the different risks are included: the environment, population and economy/property/infrastructure. How is overall impact of a risk/scenario determined based on these three categories? Is it an average of the different impact scores?
8	Each of the three categories contains a number of "sub" impacts. For the environment two of these are for example contamination and degradation. How are these sub impacts used in determining the overall impact per category? What is the effect of a "yes" score?
9	The summary document indicates that the full Report on Threats to National Security also contains threats caused by intentional human activities, of a terrorist nature and those that are political and military. Do these additional types of risks also come with additional impact areas (other than population, economic/property/infrastructure and environment)? If so, what are they?
10	The Polish national risk assessment has included "losses in the national heritage" as a potential consequence. How have you defined national heritage? Does it only include material elements such as buildings and artwork or also more immaterial aspects such as national traditions or songs/poetry?

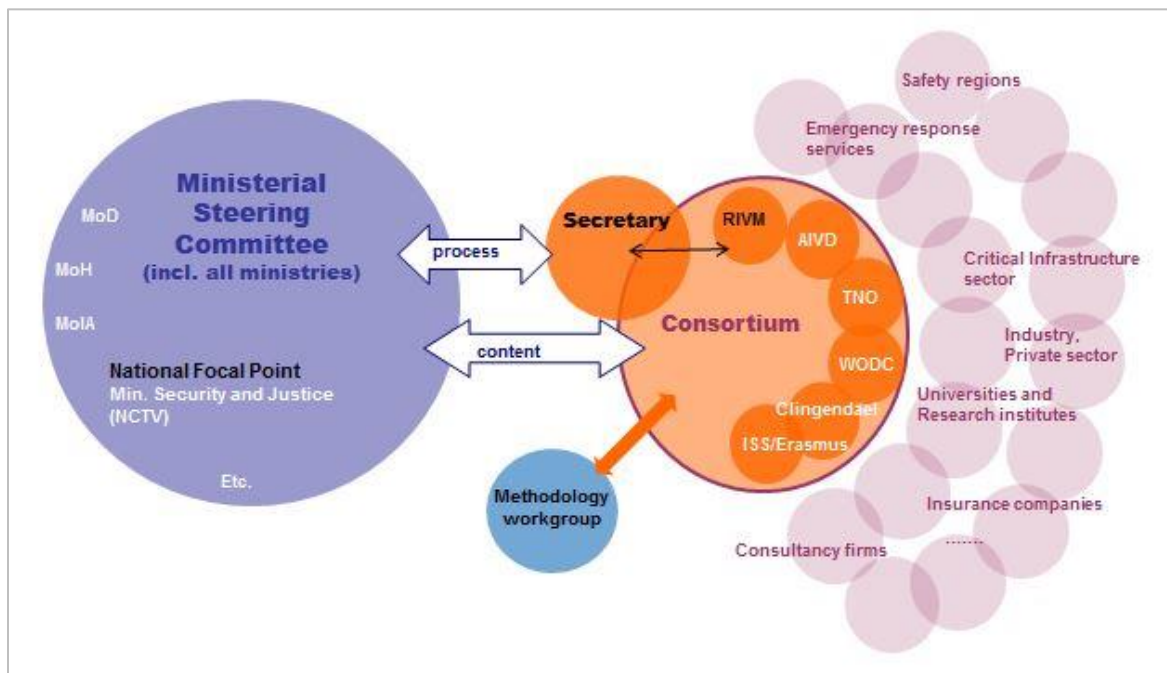
11	Why have you chosen to include losses in national heritage as a separate item?
12	Several departments of the Polish national government have contributed to the production of the Report on Threats to National Security. Are there also similar initiatives on a regional or local level? If so, are they in any way linked with the national report?
13	Has there been a lot of exchange of ideas and/or cooperation with other (European) countries during the production of the Polish NRA?

Attachment 5 – The National Network of Safety and Security Analysts

The ANV consists of six core organisations with wide-ranging areas of expertise, that in turn have established connections with other public and private actors which can provide support if needed. It reports directly to the Ministerial Steering Committee on National Security. The six organisations are:

- The Dutch National Institute for Public Health and the Environment (RIVM);
- The Clingendael Institute for international Relations;
- The Dutch General Intelligence and security Service (AIVD);
- The Scientific Research and Documentation Centre of the Ministry of Security and Justice (WODC);
- The Institute of Social Studies of the University of Rotterdam (ISS) and
- The Netherlands Organisation for applied scientific research TNO (TNO).

Of these six entities, the RIVM is the lead organisation and as such provides the network's secretary (ANV, 2016a, p.198-199). The image below shows the composition of the core element of the ANV, the "consortium", and its relations with other actors. To the right are they public and private partners of the ANV and to the left the ministerial overhead. There is also a separate working group to assist the ANV on methodological matters.



The National Network of Safety and Security Analysts (ANV, 2016a, p.199)