Known and unknown risks – future challenges for local social services

Report for the Nordic Council of Ministers

Guðný Björk Eydal, Rasmus Dahlberg, Ingibjörg Lilja Ómarsdóttir, Carin Björngren Cuadra, Björn Hvinden, Merja Rapeli and Tapio Salonen

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Guðný Björk Eydal, Carin Cuadra, Rasmus Dahlberg, Björn Hvinden, Ingibjörg Lilja Ómarsdóttir, Merja Rapelli and Tapio Salonen

1. INTRODUCTION

This report is a product of *The Nordic Welfare Watch* research project. It was carried out during the Icelandic Presidency Program in the Nordic Council of Ministers 2014-2017 and was funded by the Council. *The Nordic Welfare Watch*[1] aimed at promoting and strengthening the sustainability of Nordic welfare systems through cooperation, research and mutual exchange of acquired experience and knowledge. A further objective was to provide means and recommendations useful for policy making, to better prepare welfare systems to meet future challenges.

The Nordic countries have traditionally been viewed as safe and secure societies to live in. Natural hazards in these countries are rare compared to many other areas in the world and the risk of disasters caused by technological hazards or intentional acts is usually perceived as fairly low. The Nordic welfare states are decentralized, complex, with a high degree of equality, active labour markets and low wage differentiation and a high taxation level providing stability and robustness, but developments such as digitalization, globalization and climate change constitute challenges that may bring about fundamental changes to the social and political order (Greve, 2007). As the welfare states come under pressure from economic and political changes, primarily Europeanization and globalization as well as climate change, it is relevant and necessary to review the risk profiles for the Nordic welfare states

In 2016 the authors published a report titled *Local social services in Nordic countries in times of disaster* (Eydal, Ómarsdóttir, Cuadra, Dahlberg, Hvinden, Rapelli and Salonen, 2016). The report was a part of the results in the Nordic Welfare Watch project and looked at whether the local social services had a role in the contingency planning of the emergent management systems. The report showed that, despite some organizational differences, the social services have legal obligation to prepare their own contingency plan. **This report asks what risks the social services should be preparing for?** It is obviously impossible to predict which disaster strikes next in the Nordic region but all the emergency management systems do conduct risk analysis. The Norwegian report on risk analysis explains: "The National Risk Analysis is not a complete overview of risk and

[1] For further information about The Nordic Welfare Watch, see website: https://eng.velferdarraduneyti.is/nordicwelfarewatch/

vulnerability in Norway. The most serious events are often completely unexpected" (DSB, 2014, p. 5). Nevertheless the National Risk Analysis provides the social service in each country with a roadmap and information about the known risks, and are hence an important tool when the social services prepare for future tasks and challenges. Or as the Norwegian report asks "In what manner is one´s own sector affected by the events, and what responsibility does the individual sector have for preventing and handling the events?" (DSB, 2014, p. 2).

It is important to note that the report is aimed at providing knowledge on the concept of risk and the risk analysis but not at providing results on how the social services in each country should prepare. Hence the report starts with a chapter on the concept of risk, a theoretical discussion about the concept and how it is applied in risk assessment. The chapter also draws upon a constructed case scenario, that could take place in any of the Nordic countries, a severe snowstorm in Winterland. Finally the chapter discusses how risk can be managed. Chapter 3 is about assessing risk and results of the national risk assessments. The Nordic countries do not follow the same methods, some follow the non-mandatory EU guidelines while other have their own, but they all employ an all-hazard approach (instead of e.g. a narrow approach that would only focus on specific national hazards). The all-hazard approach applies a more holistic perspective on societal risks and addresses the complex interplay between both natural and men-made hazards and vulnerabilities and resilience.

Rasmus Dahlberg with Guðný Björk Eydal, Carin Cuadra, Björn Hvinden, Ingibjörg Lilja Ómarsdóttir, Merja Rapelli and Tapio Salonen

2. THE CONCEPT OF RISK

The perception and management of societal risks are key elements in the process of change as social organization is also an organization of bias: "We choose the risks in the same package as we choose our social institutions" (Douglas and Wildavsky, 1983, p. 9). Following from this approach risk is not "out there" as objective fact, but rather constructed socially as the product of experience and expectations. Risk does not exist on its own, only in context. Risk is socially constructed and can as such only be understood socially – as relations between individuals and institutions, between actors and structures, among communities, organizations and societies (Tierney, 2014).

Preparing for an uncertain future requires an understanding of the concept of risk. What is risk? How do we identify risk? And how do we measure risk? If we cannot define risk it will be impossible to spot it. And if we can't measure risk we will not be able to prioritize our limited resources in a sensible way. This may sound very theoretical and detached from the every-day realities of practitioners in social services and emergency management. But abstract uncertainties have a tendency to eventually materialize as very tangible problems that need to be mitigated and managed by practitioners at the sharp end of the system. Behind every assessment lies a conceptual understanding of risk, and all forecasts build on some particular notion of uncertainty and predictability. To prepare well for the future it is necessary to contemplate the ways that we think and talk about the future and the risks that we may face.

2.1 Scenario: A week in Winterland

In April 2016 scholars and practitioners from social services, social science and emergency management in all of the Nordic countries met in Iceland to discuss the implications of societal risk and vulnerabilities in the contemporary Nordic welfare states[2]. To create a common platform for discussing these complicated issues, a scenario was presented.

It begins as any other beautiful January day in Winterland, an average size municipality in a typical Nordic country. Approximately 25,000 people live here in an area

[2] For further information on the workshop *Communities coping with Crisis* 20-22 of April 2016, please see https://eng.velferdarraduneyti.is/nordicwelfarewatch/in-response-to-crises/nr/35809

of about 500 square kilometers (190 square miles) comprised of farmland, hills and a single larger settlement, Wintertown, which has a little over 10,000 inhabitants. Ten smaller towns and villages spread out over the municipality are each home to between 500 and 1,000 people, while the rest of Winterland's inhabitants live in small scattered hamlets or on isolated farms. The nation's capital attracts many young Winterlanders who move away for higher education and jobs who later return to settle with families. That leaves Winterland with a large percentage of school-seeking children, young couples on parental leave, and care-needing elderly people, straining the municipal budgets every year. Two large state-run institutions are located in the area: a prison with 1,000 inmates and a reception center for refugees and immigrants, currently occupied by approximately 3,000 people. Regional health authorities also operate a hospital in Wintertown, and a facility for children with severe mental and physical disabilities is located in a rural area.

People in Winterland get up in the morning as usual and leave for work, dropping off their kids at kindergartens or schools on the way. Wearing parkas and boots they make their way through the snow that started falling during the night and now covers fields and towns with a thick layer of cotton-like white. Municipal workers in their snowplows and small tractors with rotating brushes and yellow lights have cleared all roads but the smallest ones early in the morning. It is not an emergency situation. Snow has fallen in this area since long before people lived here, and the system is well prepared just as the inhabitants. "There is no such thing as bad weather", Winterlanders say with tongue in cheek. "Only wrong clothes."

Meteorologists have been monitoring the weather closely for weeks to produce the best possible forecasts. They know that people are depending on their ability to see into the future, but even with modern technology and science precise weather prediction is just not possible (Fine, 2010). Sometimes it works – sometimes it doesn't. Very small variations in wind direction, temperatures and humidity can have enormous consequences for the forecasts. "Essentially, all models are wrong, but some models are useful", wrote the statistician George E.P Box (in Box and Draper, 1987, p. 424). That statement is very true in meteorology where the usefulness of models is tested regularly against the inherent predictability horizons in complex weather systems. The snowstorm that hit the D.C. region in the United States in January 2016, for example, was rather predictable, while another snowstorm in the same area 16 years before produced 18

inches (46 cm) of snow instead of the two inches that were mentioned in the forecasts (Fritz, 2016).

The weather system that the Winterland meteorologists have kept an eye on has approached from the west. Meanwhile, another weather system has moved in from the south more rapidly than anyone had imagined, resulting in a highly unexpected collision between very cold and somewhat warmer air. Last night, the local weather reports forecasted only a few inches of snow but now the situation is totally different. Heavy clouds keep assembling above the municipality, unleashing huge amounts of snow. Warnings are issued in the morning, but most people are now at work and the schools and institutions are full of children. As noon approaches, many smaller roads close down, while municipality workers work hard to keep the main community arteries open to traffic.

During the day the people of Winterland begin to realize that the situation is acute. Teachers are waiting for parents to pick up their children, but it has become almost impossible to drive through the massive amounts of snow. The police coordinate shelters for the children, while concerned parents overload the telephone system or get caught in their cars while desperately trying to reach their offspring. To begin with most people, however, find the situation quite amusing. They put on warm clothes and go outside to enjoy an afternoon of fun and play in a Winterland shrouded in snow. But as darkness begins to settle, while heavy snow is still falling, some inhabitants wish they had stockpiled more food and topped off their supplies of drinking water in case the pipelines freezes up.

The next morning the entire municipality is covered by a thick layer of snow that muffles all sounds and creates an eerie sense of immobility. Only the still falling snow injects some kind of movement into the still life image. Temperatures have dropped dramatically during the night, so there is no hope of the snow beginning to thaw soon. The freezing cold also creates other problems for the poor Winterlanders: as ice builds up on the power lines connecting Wintertown and the smaller settlements to the national grid they become so heavy that wires eventually break. Community after community loses power due to this. People light candles and fire up their stoves as they slowly realize that power will not be restored immediately. Refrigerators and freezers stop working, heating water and food becomes difficult or impossible, and means of communication

gradually loses functionality: Internet connections, cell phones and eventually also landlines becomes useless.

Less than 36 hours after the heavy snowfall began the first weather-related death occurs in Winterland. An 87-year old woman living alone in her house in a remote area succumbs to the cold after having lost the electrical power that she usually heats her house with. The local social services normally tend to her twice a day, but the emergency preparedness plans did not take into account a situation where the entire municipality would be affected by extreme weather. As the roads closed social workers and homecare nurses were unable to make their way to the old woman, and because of inadequate procedures the location of her house was not passed on to the army when they arrived to provide assistance with tracked vehicles.

On the third day of the disaster, the mayor of Winterland addresses the situation on live television from the Emergency Operations Center (EOC), located at the police station just across Main Street from the city hall. “Dear citizens,” he says, clearly under a lot of pressure. “We could not predict this. It has never happened before, and therefore it took us totally by surprise. Our preparedness plans were in place, and we activated the municipal crisis management system, but the disaster is not over yet. I urge everybody to stay calm and assist each other the best you can. Together, we will survive this and make sure that soon Winterland will return to normalcy.”

As the mayor speaks, snow that has piled up collapses a roof at the refugee center, injuring more than one hundred people of whom none speaks the local language. The homeless people, the alcoholics and the drug addicts of Winterland seek refuge in cellars and shelters, but as society gradually shuts down they start dying in the streets. The warden of the prison is desperately trying to get in contact with someone at the EOC after two inmates have been found frozen to death in their cells. The hospital’s emergency generator just ran out of diesel. And at the institution for mentally and physically disabled children they have almost used up the last of their food supplies.

2.2 State of the field: Local social services in times of crisis

In recent years, the literature has emphasised the important role of social services in managing disasters at the local level and enhancing inhabitants’ resilience (e.g., Gillespie and Danso, 2010; Tesh, 2015). Furthermore, the growing literature on the role of local social services reports its important roles in disaster mitigation, preparedness, response

and recovery (Cuadra, 2015; Dominelli, 2012; Elliott, 2010; Mathbor, 2007; Rowlands, 2013; Thomas and Healy, 2010). An example is Rowlands, who conducted research on Australia's disaster recovery planning and management approach. The study points out the following: "The full range of community and social service providers needs to be integrated into response and recovery processes, through the recovery plan, so that these resources can be harnessed for the community" (Rowlands, 2013, p. 15).

All modern welfare states provide social services. These include both social care services and social assistance. Their main goal is to ensure that the basic needs of inhabitants for care and support are met. The definition of basic needs and the division of labour between local social services and other actors, as well as the degree of centralization of services, vary by country (Munday, 2004; Sipilä, 1997). Furthermore, the size of the local social services depends on various factors.

First, ideologies and politics frame the volume and role of social services. In some countries, the third sector provides a substantial part of the social services. In such cases, municipal services are not as extensive. Another defining factor is the population's need for such services, e.g., the demographic composition of the inhabitants. Last but not least, the definition of the role of the local social services is an important factor. For example, it matters whether the role is primarily to provide basic services to individuals and families, or the role is to include structural and preventive work and working with the community, usually adopting the methods of community work (Eydal, et al., 2016). The literature highlights some of the main roles played by social services in times of disaster: enhancing resilience and working with vulnerable groups; ensuring basic needs, for shelter, food and support, providing psychosocial support and working with the community. The literature emphasises strongly the need for co-operation between institutions and the third sector due to the need for extra manpower and resources in cases of major disasters and crisis (Cuadra, 2015; Elliott, 2010; Rapeli, 2017).

Despite the strong tradition and extensive roles of local social services in the Nordic countries, research on its roles during times of disaster has not been extensive. Two case studies are on going. The Swedish project *Stärkt roll för socialtjänsten i kommunala risk- och sårbarhetsanalyser (Sorsa),* led by Carin Björngren Cuadra (2015-2017), focuses on developing and testing a model. The model contributes to the integration of municipal risk and vulnerability analysis in Social Services' core operations.

In addition, the aim is to guarantee that the knowledge and the perspectives of Social Services are taken into account in risk and vulnerability analysis. The project is operating in four Swedish municipalities and ends in 2016. In Finland Merja Rapelli is conducting a study on social services and social work disaster preparedness. The aim is to assess the level of preparedness and the disaster-related roles of social work and services in Finland. Contingency plan documents of local social services form the main data of her research (Rapeli, 2017). These projects point to the importance of increased research and development regarding the role of social services in the context of disasters. Furthermore the authors of this report also conducted a study that focused on role of social services in the emergency management systems in the five Nordic countries (Eydal et al., 2016; Rapeli et al., 2017). It investigated whether local social services have a formal role in the contingency planning of the systems. The main findings show that Finland, Norway and Sweden specifically address the role of social services in times of disaster in their legal frameworks on emergency management. Finland and Norway also address the role in the law on social services. In Sweden, the role is more implicit as the social service act applies regardless of circumstances. All the five countries expect all authorities to make a contingency plan. This means that even if the law in Denmark and Iceland does not address the roles of social services, the services are legally obligated to make contingency plans. Furthermore, Finland, Norway and Sweden have prepared special guidelines on contingency planning for social services (op. cit.).

Hence, despite the facts that the Nordic countries are known for their extensive welfare systems, and that extensive literature exists on the Nordic social services, only few studies have addressed the role of the welfare state in the context of disaster. Thus, the Nordic countries have a lot to learn from countries that have extensive experience in the field but might not have been influential in welfare research. In this regard, Mathbor (2007, p. 358) points out that “in the wake of the disasters brought about in the United States by Hurricanes Katarina, Rita and Wilma, American social workers have much to learn from countries that have faced similar tragedies including those in South Asia, particularly Bangladesh…that [have] developed a successful mechanism that utilizes social capital to recover and rebuild after each disaster that hits the country.”

2.3 Probability and prediction

Notice what the mayor of Winterland said: "We could not predict this." That was a political statement that ended up sounding more like an excuse for bad municipal risk management, but no journalists asked him what he meant because they did not understand the context themselves. Risk, uncertainty and predictability are difficult concepts that require some philosophical contemplation. The story begins with sages and seers in the Ancient world who made predictions from signs in animal intestines and other mystical practices and is transformed in the 17th and 18th centuries into a scientific revolution in probability theory.

This revolution began with Pascal and Fermat in the 1650s and ended with Pierre Simon marquis de Laplace – the "Newton of France" around the turn of the 19th century. A theoretical discussion aimed at solving practical problems in games of chance led to the development of a set of powerful tools that would enable mathematicians to predict the outcome of random processes. Early probability theory laid the foundations for what has become known as the "frequentist" approach, which looks at a time series of results or a sample from a population and on the basis hereof makes statements about the future, i.e. the distribution of results from rolls of fair dice or draws from an urn with an unknown content of colored balls. In the second half of the 18th century Thomas Bayes, a British amateur mathematician, contributed with a different approach to probability that today bears his name: "Bayesianism." In this approach an a priori subjective assessment of probability is updated with data from a sample, providing the analyst with an a posteriori probability (Hacking, 2006).

Probabilistic thinking was, however, not the normal scientific paradigm of the Age of Reason – that honor fell to determinism. Cartesian causality reached its climax with geniuses like Newton and not least Laplace, who summed up the clockwork-interpretation of nature and the universe:

> We ought then to regard the present state of the universe as the effect of its anterior state and as the one which is to follow. Given for one instant an intelligence which could comprehend all the forces by which nature is animated and the respective situation of the beings who compose it – an intelligence sufficiently vast to submit these data to analysis – it would embrace in the same formulate the movements of the greatest bodies of the universe and those of the lightest atom; for it, nothing

> would be uncertain and the future, as the past, would be present to its eyes (Laplace, 1902, p. 4).

The "intelligence" that Laplace speaks of became known as the Laplacian demon – a creature with total knowledge of all laws of nature and, therefore, also the ability to precisely predict the future from past observations. While Newton had little interest in probability, Laplace embraced it, although he saw it merely as a way of dealing with the shortcomings of observations. To him, the universe was fundamentally deterministic, but due to the lack of precise tools for measurement it was necessary to correct observational errors. For this purpose Laplace came up with the "error function", an early precursor to the normal distribution that in the 19th century would be named after Carl Gauss (Salzburg, 2001).

Probability theory launched what Ian Hacking has called an "avalanche of numbers" in the 1800s. Statistics – the application of probability theory on matters of state, hence the name – became the preferred method for modern governance, especially in the European nation states that emerged after the Napoleonic era. Prussia founded Europe's first statistical bureau by decree of the king in 1805 with France and most other western countries to follow. To begin with these bureaus simply counted everything that could be counted, people, property, animals etc., and categorized it into social classes, gender, age groups etc. However, the statistical tools available were still fairly primitive, often limited to averages and other descriptive calculations. That did not prevent some early scholars in the field to become almost obsessed with employ these new "magic" explanations. One of them was Adolphe Quételet (1796-1874), who has inspired the term "quételesmus" denoting the tendency to see normal distributions everywhere.

Meanwhile, as the nation states of Europe were founded on statistical principles during the 19th century, the strict determinism in natural science eroded gradually. The philosopher C.S. Pierce concluded on that process when he wrote in 1892 that "I believe I have thus subjected to fair examination all the important reasons for adhering to the theory of universal necessity, and shown their nullity" (Hacking 1990, p. 11). In less than 100 years, from Laplace's vision of total knowledge and perfect prediction, nature and society had become truly statistical with probability theory replacing classical mechanics as the mainstays of the scientific paradigm. Now, the tools became much more advanced.

The Victorian genius Francis Galton had developed the foundations for correlation and regression in the last decades of the 19th century, and in the early 20th century focus shifted to the United States. Agricultural science had come to a standstill: almost a century of data collection and experimenting with crop production had produced very little else than scientific dispute. Enter Ronald Aylmer Fisher, a mathematician who would revolutionize the way scientists thought about experiments. The problem with the agriculture science was that even though the scientists had collected a lot of data, everything was one big mess. The fertility for one field was very different from another, which the scientists tried to correct with formulas that Fisher could show were inadequate. Instead, Fisher developed a whole new way of designing experiments that would require the scientist to begin with a mathematical model instead of the data collection. That was the birth of modeling – a concept so central to today's statistical science (Salzburg, 2001, p. 6-7).

Under the intellectual leadership of Karl Pearson statistics matured in the first half of the 20th century into a coherent theoretical framework that came to permeate all of the social and natural sciences with central concepts such as statistical significance and regression analysis. Large bureaucracies, populated with hordes of young men and women armed with calculators, provided decision-makers with predictions based not on deterministic laws, but mathematical models deduced from theories. Roosevelt's New Deal in the early 1930s produced such a bureaucracy, which also became the preferred modus operandi of the European welfare states that matured during the 20th century. Governing by numbers, soon aided by computers and improved tools for data collection, was equally popular in socialist as well as capitalist countries, with scientific forecasting used either for planning or regulating society.

2.4 The roots of risk

This long digression into the history of probability and statistics is required to understand how the concepts of risk and uncertainty came to be interpreted. Risk and risk assessment also has a long history, even longer than probability, and it begins with the concept of insurance. The ancient Chinese used a kind of insurance system to disperse risk among maritime traders, and that practice was institutionalized with the first early

modern underwriters in Italy in the 1300s. In the centuries that followed the concept of risk and insurance spread to other nations, not least England, where the great Fire of London in 1666 exhibited the need for mitigating the economic repercussions of the unforeseen. Insurance also became an integrated part of colonial and post-colonial North America with Benjamin Franklin being among the founders of the first fire insurance company there in 1759 Some scholars have argued that this "insurance society" marked the transition in to modernity (Powers, 2012; Zinn, 2008).

Risk is closely related to decision-making under conditions of uncertainty. As with probability, risk thinking has its theoretical roots in games of chance: when to make a bet at the table and when not to is a question of calculating the risk of different options. Such thinking moved from gaming to the societal level as secularization gradually set humans free to become masters of Nature and their own fate. However, it wasn't until the 19th century that risk really moved into the realm of modernity as an integral part of industrialization and finance. Optimization of production, trading of stocks and bonds, and handling of increasingly dangerous materials all required thorough calculation of the risks involved (Silver, 2012).

Just as statistical science was taking off, 1921 turned out to be a pivotal year in the history of risk and uncertainty as it saw the publication of two important texts that both dealt with the topics in question. Frank H. Knight was an economist with a background in philosophy, and his 1921-book Risk, Uncertainty and Profit, based on his doctoral thesis, was the first scholarly work to investigate decision-making under conditions of uncertainty. The same year, his fellow economist John Maynard Keynes published A Treatise on Probability, in which he attacked the classical probabilistic views represented by Gauss, Pascal, Quételet and Laplace. Knight and Keynes shared a common distrust in classical theory and certainty and total knowledge as guiding principles in decision-making. Keynes argued that it is nonsense to believe that events will happen in the future just because they have been observed to behave in a certain pattern-like way in the past, while Knight "considered reliance on the frequency of past occurrences extremely hazardous", because "no event is ever identical to an earlier event – or to an event yet to happen" (Bernstein, 1996, p. 17, 21). They saw society as far more complex than a game of dice, and therefore economics cannot attain the same level of predictive power as neither probability in its purest sense nor classical physics.

What made especially Knight's contribution pivotal was his clear-cut distinction between risk and uncertainty, which deserves a lengthy citation:

> Uncertainty must be taken in a sense radically distinct from the familiar notion of Risk, from which it has never been properly separated. The term "risk," as loosely used in everyday speech and in economic discussion, really rover two things which, functionally at least, in the causal relations to the phenomena of economic organization, are categorically different. (…) The essential fact is that "risk" means in some cases a quantity susceptible of measurement, while at the other times it is something distinctly not of this character; and there are far-reaching crucial differences in the bearings of the phenomenon depending on which of the two is really present and operating. (…) It will appear that a measurable uncertainty, or "risk" proper, as we shall use the term, is so far different from an unmeasurable one that it is not in effect an uncertainty at all. We shall accordingly restrict the term "uncertainty" to cases of the non-quantitative type (Knight, 1921, p. 19-20).

Thereby Frank Knight differentiated risk and uncertainty in way that would permeate the entire field of risk thinking far beyond the boundaries of economic theory – with great implications for scholars as well as practitioners. To a large extent "what we today call risk management is 'uncertainty management' in Knightean terms, i.e. efforts to manage 'risk objects' for which probability and outcome data are, at a point in time, unavailable or defective". Knight's distinction between risk and uncertainty should therefore be seen as the starting point for contemporary definitions of risk (Derman, 2011; Power, 2007).

The problem was that what Knight termed risk could be dealt with in quantitative terms and allowed for the application of all the powerful tools that probability theory and statistical method offered, while uncertainty was a much more elusive concept that was more difficult to quantify and communicate to decision-makers as well as the public. Probabilistic Risk Assessment (PRA) became the standard in the second half of the 20th century, driven by developments in the nuclear power industry in the United States, while uncertainty was downplayed because of the difficulties involved in quantifying it.

Risk thinking moved from the private to the public sphere in the 20th century: "Modern states have played a role describable as risk management since the production of legislation to protect workers in the nineteenth century and the rise of the welfare state in the mid-twentieth" (Power, 2007, p. 17). First and foremost based on statistical analyses, national, regional and municipal governments and authorities have required more and more thorough risk analyses to base decisions on.

2.5 The Risk Society

Michael Powers' notion that "(p)urely calculative, machine-like solutions to technical problems only work well in situations where there is a very high level of agreement about knowledge and a high degree of organizational and political consent about the issue" (Power, 2007, p. 14) resonates well with the findings of Douglas and Wildavsky, who presented what they call the "Four Problems of Risk" in their influential book on Risk and Culture from the early 1980s. They represented this as a two-by-two matrix that lists the four possible combinations of knowledge and consent with regard to risk: Certain knowledge and complete consent produce technical problems, that can be solved with calculation, while certain knowledge and contested consent create problems of (dis)agreement with either coercion or discussion as the solution. The combination of uncertain knowledge and complete consent produces information problems, that require further research, while uncertain knowledge and contested consent result in what the authors call the "contemporary dilemma of risk assessment" that has no obvious solution (Douglas and Wildavsky, 1982).

		Knowledge	
		Certain	Uncertain
Consent	Complete	Problem: Technical Solution: Calculation	Problem: Information Solution: Research
	Contested	Problem: (dis)Agreement Solution: Coercion or Discussion	Problem: Knowledge and Consent Solution: ?

Source**:** Douglas and Wildawsky, 1982, p. 5.

Figure 1. The Four Problems of Risk

It was clear that new approaches to risk were necessary after the 1970's when the belief in quantitative risk assessment reached its climax. Kahneman and Tversky's studies of risk perception in individual and collective risk management showed that the heuristics they described could lead to biases in the way people assessed risks, undermining the

rational actor models that much of the risk thinking of the 20th century was based upon (for an interesting collection of heuristic biases applied to disaster thinking, see Gerstein 2008). This was the beginning of very different way of looking at risk that brought about theoretical concepts such as *risk perception* (Slovic, 2000) and the *Risk Society* (Beck, 1992) in the 1980s and 1990s.

When describing the Risk Society, German sociologist Ulrich Beck's main argument is that the risks faced by people in premodern periods where visible (as were the causes of these risks), the risks that the people of late modernity faced something complete new – and this new category of risk was symbolized by the nuclear disaster at the Chernobyl power plan, which coincidentally happened shortly before the publication of the German edition of Beck's work. While risks in modernity materialized in the class struggle etc., the risks of late modernity was able to escape perception as they hid within chemical formulas and in the confined spaces of nuclear power plants, ready to be released into the atmosphere.

Also Beck distinguishes in a knightean way between risk and uncertainty when he describes "risks" as statistical predictions of the future, while defining "uncertainty" as consisting of other systematic forms of organizing humans' experience to predict (professional judgment, ordinary foresight, rules of thumb etc.). The problem with the late modern risks, to Beck, is that it is not possible to manage them using only modern strategies of probabilistic calculation. Beck saw the new risks a problematic because there was not enough knowledge available to control their occurrence or to mitigate their negative outcomes with insurance.

To Niklas Luhmann, also German and also writing about risk in the 1990s, the concept of risk implies the possibility of decision-making about the future and a corresponding allocation of responsibility, which is not the case with the concepts of danger and uncertainty (Luhmann, 1995). Luhman argues that human behavior can only understood by investigating the so-called contingencies (the options available to them in situations of decision-making). Acknowledging that contingencies are real, as opposed to a deterministic view of human life, means that adverse effects may occur as the result of decisions (Renn, 2008). Following from this, Luhmann' was skeptical of the possibilities of steering a society or making exact prognoses of the future (Zinn, 2008).

A main analytical distinction is usually made between risk and hazard. While providing "risk" as a synonym, which is common in every day-language, Oxford Dictionaries also more precisely defines "hazard" as "a potential source of danger" (Oxford Dictionaries, n.d.). From this follows that a hazard is something that may act as a causal driver in the creation of risk. An earthquake is a natural hazard that plays a role in risk production – but hazard does not equal risk. For risk to arise another component needs to be present: vulnerability. Vulnerability can be defined as "the potential for loss" (Cutter, Boruff and Lynn, 2003, p. 242) and risk is often understood as a product of the interaction between hazard and vulnerability. Without a hazard vulnerability may not be revealed, and without vulnerability a hazard is – just a hazard. In some definitions of risk the element of either "capacity" or "exposure" is also included. Exposure denotes the actual confrontation of the "potentialities" of danger and loss, while capacity mitigates risk by reducing the vulnerabilities that occur at the intersection of social, economic, natural and built environment.

Cutter et al. (2003) list some of the major contributing factors influencing social vulnerability: lack of access to resources (including information, knowledge, and technology); limited access to political power and representation; social capital, including social networks and connections; beliefs and customs; building stock and age; frail and physically limited individuals; and type and density of infrastructure and lifelines. It follows from this that those "people who are totally dependent on social services for survival are already economically and socially marginalized and require additional support in the post-disaster period" (Cutter et al., 2003, p. 249).

An integration of this approach is found in the Pressure and Release (PAR) model that builds on an understanding of risk as the product of vulnerability and hazard, which defies the common distinction between natural and manmade disasters and instead attributes disaster to intersections between vulnerable socio-economic or /-technological systems and hazards that may be either natural or manmade as well as intentional or non-intentional. First presented by a group of scholars in the mid-1990s, the PAR model, also known as the "crunch model," explains disaster as a "progression of vulnerability" where root causes produce dynamic pressures that eventually create unsafe conditions (Wisner, Blaikie, Cannon and Davis, 2004). Root causes are underlying economic, demographic and political processes, while dynamic pressure is understood as local

translations of these, e.g. urbanization. Unsafe conditions are concrete manifestations of vulnerability due to dynamic pressures, e.g. people living in hazard-prone areas. When natural hazards apply pressure to vulnerable social systems, disaster is the result. Social groups are at risk if they can be said to be vulnerable and exposed to a hazard at the same time. Pressure builds up on both sides of the model (hence the nickname "crunch model"), while only reducing vulnerability can release this pressure, as many natural hazards (e.g. earthquakes and volcanic eruptions) cannot be prevented.

Building on this understanding of risk, socially vulnerable individuals and groups are those who have the least capacity to prepare for, respond to, and recover from disaster events caused by intersections between hazards and vulnerabilities. An example: An earthquake occurs and impacts a social system (a city) broadly. Those who are in in earthquake resistant structures are less vulnerable than those residing in unsafe buildings at the time of impact. In the response and recovery phases some individuals and groups may reveal themselves to possess certain capacities such as strong social networks, insurance or strong health that help them survive the impact and recover faster and easier than others. Research indicates that social vulnerabilities and capacities are not created during a disaster, but rather amplified from existing social inequalities (Eydal et al., 2016). Thus, those who were without resources before the disaster will not suddenly rise up and present new capacities after.

2.6. Managing risk

Risk can be understood as a form of organized uncertainty: "Uncertainty is therefore transformed into risk when it becomes an object of management, regardless of the extent of information about probability" (Power, 2007, p. 6). Jens O. Zinn also sees risk as a "specific form of managing uncertainty – it is about the way uncertainties are (rationally) managed, and the theories vary regarding the degree of rationality, from a calculative practice to any form of purposeful management of uncertainty" (Zinn, 2008, p. 173).

Following Luhman, we can also say that uncertainty is closely interlinked with decision-making, and therefore uncertainty is of great importance to emergency managers, as they typically are unable to postpone decisions (a preferred strategy for government officials and politicians when facing uncertainty) due to imminent threats to life, health or property (Handmer, 2008). Historically, emergency management has been

related to interpretations of risk, uncertainty and decision-making. First came the concept of insurance in the Renaissance, then the first European fire brigades in the 1600s as a consequence of urbanization. Disaster and emergency management on a larger scale, however, did not evolve until the middle of the 18th century with the Great Earthquake of Lisbon in 1755 as the pivotal moment. This catastrophe, which claimed more than 20,000 lives in one of Europe's most flourishing capitals, fueled scientific approaches to the concept of disasters as well as the process of secularization in general (Dynes, 2000; Lindell, 2013).

Modern emergency management has its roots in civil defense organizations and dates back to the first aerial bombardments in the United Kingdom from zeppelins during the First World War. In the interwar period civil defense organizations were created in many European countries, especially after the bombing of Guernica in 1937 during the Spanish Civil War by German military aircraft. Civil defense organizations were tasked with construction and operation of shelters, distribution of equipment such as gas masks, fire fighting and search and rescue during the Second World War, and in the decades that followed they focused on preparations for the protection of populations in case of nuclear war. After the end of the Cold War civil defense organizations in many countries were reorganized into governmental emergency management agencies and state-approved volunteer organizations with much broader portfolios that include disaster preparedness, assistance to large-scale emergencies and, most recently, homeland security tasks.

And all along uncertainty was a companion of the development of modern emergency management. Societal uncertainty can manifest itself in positive as well as negative ways – as opportunities for creation, innovation and entrepreneurship, but also as risk in the shape of possibility of loss (of life, health or property). Emergency management deals with so-called "residual risk", which is the risk that is left when all the manageable risks have been dealt with (Handmer, 2008). This way of looking at emergency management resonates well with Nassim Taleb's statement that we "cannot plan, because we do not understand the future – but this is not necessarily bad news. We could plan while bearing in mind such limitations. It just takes guts" (Taleb, 2008, p. 157) and Emanuel Derman's good advice: "The best you can do with unquantifiable uncertainty is to be aware of it and aware of your inability to quantify it, and then to act

accordingly" (Derman, 2011, p. 154). In the beginning of the 21st century, risk management has, in practical terms, become uncertainty management.

Rasmus Dahlberg with Guðný Björk Eydal, Carin Cuadra, Björn Hvinden, Ingibjörg Lilja Ómarsdóttir, Merja Rapelli and Tapio Salonen

3. ASSESSING RISK

In accordance with European Union requirements and to satisfy their own needs the Nordic Countries, EU member-states as well as non-member states, carry out regular national risk assessments. Some follow the non-mandatory EU guidelines (for example Finland), while other countries have developed their own methodologies (for example Denmark). A common trait for all Nordic countries is that they in general take an all-hazards approach to national risk assessment – as opposed to other European countries (for example Greece) with a tradition for a stronger focus on specific natural hazards in their risk assessment work. An all-hazards approach takes a more holistic approach to societal risks, addressing the complex interplay between both natural and man-made hazards and vulnerabilities and capacities.

Former US Secretary of Defense Donald Rumsfeld spoke in 2002 about the ”known knowns”, the ” known unknowns” and the ”unknown unknowns”, and that categorization of knowledge resonates well with the challenges in risk assessment. The “known knowns” are the things that you know that you know – everything that can be measured, analyzed, understood and represented precisely using the techniques that have been developed over the last centuries in positivist science. Here we find events that happen quite often with a certain regularity, although the particular event is still unpredictable, i.e. traffic accidents: the transportation authorities in all the Nordic countries can predict with a fair amount of precision how many traffic accidents there will be next year, but the where and when they will happen is difficult/impossible to say. Early sociologist Emile Durkheim’s famous example of this is concerned with the question of suicides in society, which is surprisingly predictable on the macro-level, but very difficult to predict on the micro level (Perez, 2008, p. 148). The point is that when we have enough occurrences it is possible to apply methods from frequentist probability theory to predict the future in same way that we may predict the distribution of outcomes of rolls of fair dice.

The “known unknowns” are the things that we know that we do not know, i.e. identified uncertainty that can either have to do with the likelihood of an event or the potential impact of its occurrance. Earthquakes happen, but too infrequently for scientists

to make precise predictions based on past occurrences – and at the same time too little of the geophysical processes involved are understood well enough to predict from precursors (Hough, 2010). Weather forecasting also has its "known unknowns" in the form of so-called "predictability horizons": short-term weather is fairly predictable because the physical and chemical processes in meteorology are well understood, but after about a week the nonlinear dynamics ("chaos") of weather means that even the finest measurements and best computers in the world are not good enough to make predictions that will hold. Long-term weather, called climate, is again more predictable because of predictable macro-level patterns (Kravtsov, 1993).

As Rumsfeld said, the real challenge is how to deal with the "unknown unknowns": the things you don't know that you don't know (Aven, 2014, p. 12). These are the Black Swans, as Nassim Taleb calls them, the nasty surprises you get if your entire worldview is built upon the notion that "all swans I've seen are white, ergo all swans are white" and then, suddenly, you see a black swan. Black Swan events are totally unforeseen by those in charge, have huge consequences and look in retrospect like something we should have seen coming. When a German passenger plane crashed in the Alps in 2015 after the co-pilot locked the captain out of the cockpit and forced the plane into the ground it was a Black Swan event to authorities, airlines and the public, even if something similar had happened a few times before.

A fourth category could be added to the original Rumsfeld-quote, based on the title of a documentary about him directed by Errol Morris: the "unknown knowns". These are the things that we do not know that we know – the tacit knowledge in an organization that is never written down, or distributed knowledge in a network, so that the network as a whole knows something without anyone possessing the full picture. Was 9/11 an "unknown unknown" or "unknown known"? The Congressional commission investigating the terror attacks criticized the US intelligence agencies for failing to "connect the dots", but it could be said that it was only after the terrible incidents that the idea of hijacking passenger planes to use them as weapons came to exist in most people's minds. This is a question of epistemological issues vs. ontological: Should we just look harder or doesn't it exist at all?

Risk assessment denotes the systematic evaluation of potential risks involved in a planned activity or an existing system as part of a broader risk management process. The

outcome of a risk assessment is often presented as a matrix with probability/likelihood on one of the axes and consequence/impact on the other, testifying to an overall understanding of risk as the product of those variables.

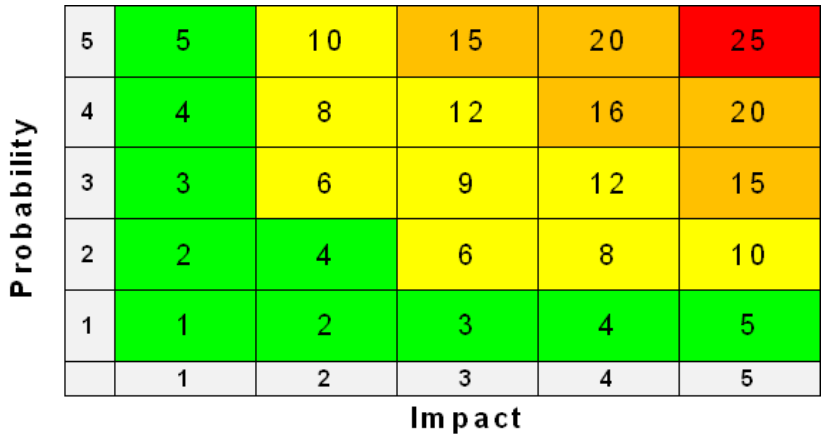

Figure 2. The classisk risk matrix: A visualization of risk as the product of x and y.

While this is a powerful tool for communicating risk to decision makers, it is also a simplistic approach that may underplay the role of uncertainty in risk assessment. In disaster management, risk assessment is focused on hazard identification and analysis of vulnerability and is often carried out in a much more qualitative, descriptive way than for example in high-risk industries. National risk assessments are typically the responsibility of national emergency management authorities and may be comprehensive documents combining several qualitative and quantitative methodologies. For member states in the European Union it is mandatory to submit national risk assessments every third year to the European Commission, which has published non-binding guidelines on the subject.

Quantitative risk assessment uses methods based on probability theory and statistical analysis to express the likelihood and the impact of disasters according to predetermined measurement scales. These scales will often be financial measures or measures of fatalities. Quantitative analysis requires significant time and cost to assemble the required metrics. Often this assessment will contain calculations of the probability of a loss as well as the magnitude of such loss. The advantage (as well as weakness) of these assessments is the ability to encapsulate the complex and diverse processes of disasters into numerical form, but they are costly and demand a certain set of technical skills.

Qualitative risk assessment is an analytical method that uses narratives rather than numbers to estimate the potential magnitude and likelihood of disasters. This type

of risk assessment can be carried out when there is inadequate reliable information to quantify risks, or the assessments can be carried as a way to engage as many stakeholders as possible. Qualitative risk assessments can also consist of scenario-analysis where the risks and consequences of disaster are described through different future scenarios. The advantage of qualitative assessments is that risks can be expressed across multiple dimensions and that the assessment process is more inclusive to local participation.

While quantitative risk assessments might pay less attention to precautionary or preventative measures as well as indigenous knowledge, as these factors are harder to include in the calculations, perceptions of risks and vulnerability are often included in qualitative assessments. The weakness of qualitative assessments is that they cannot easily be summarized and compared across disasters and countries. Community risk assessment constitutes one type of qualitative risk assessment.

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4. RISK ASSESSMENT IN THE NORDIC COUNTRIES

Risk assessments are essential when it comes to understanding the challenges that may affect Nordic societies, both in terms of natural and man-made hazards. When a risk assessment is conducted the society is identifying hazards and evaluating risks associated with the hazards. Risk assessments are of vital importance because they increase awareness of hazards and risks, identify who may be at risk and based on the assessments appropriate measures are taken (DEMA, 2013; DSB, 2014).

As other vital functions of the society, local social services must acknowledge the risks that they might face in relation to their activities, both regarding the services they provide on daily basis and increased services needed during and following disasters. By using the national risk assessments the local social services in the Nordic region can improve their risk awareness, which is necessary in order to be well prepared for possible disasters. Following chapter discusses the hazards and risks identified by the Emergency management authorities in each Nordic country.

4.1 Denmark

Denmark has faced several disasters in previous years which have derived from fires, storms, cloudbursts, snow storms, oil spills, technical accidents and terror attacks. Flooding for example is a seasonal risk in some parts of the country that are protected from the sea by a system of dikes (European Commission, n.d.-a). Global climate change has serious consequences in Denmark as in other countries. The increase in extreme weather events in recent years in Denmark has posed severe challenges mainly related to water level management. Cloudbursts have also been a challenge in Denmark and the one that occurred in 2 July 2011 resulted in damage worth over DKK 6 billion. The risks in relation to act of terror in Denmark are related to global threats and due to global developments the current overall threat picture against Denmark is considered more fragmented, dynamic and complex (DEMA, 2013).

The Danish Emergency Management Agency (DEMA) is responsible for mapping and analysing risks in Denmark. DEMA gathers information which unfolds the characteristics and causal relations of each risk, how the overall risk picture currently looks, and how it may develop in the future. The *National Risk Profile*, from 2013, provides an overview of the most serious natural and man-made risks from a Danish view-point[3]. It is also intended as a contribution to the contingency planning among organisations, both within different sectors, across sectors, and at the central level of the national emergency management. The National Risk Profile does not address all risks that might challenge the Danish society, but focuses on those which DEMA considers the most important for preparedness planners and operators (DEMA, 2013).

DEMA conducts the National Risk Profile partly on its own initiative and partly in compliance with an EU request[4] that its Member States should draft national risk assessments. Thus, the profile meets a twofold need, European as well as national (DEMA, 2013).

The focus of the National Risk Profile is on the possible consequences of the selected incidents types rather than how likely it is that they occur. Therefore, the emphasis is on historical documentation of real incidents that have affected Denmark in the past. The National Risk Profile handles 10 incidents types that might cause major accidents and disasters. These incidents are arranged into two main categories and four sub-categories, see table 1 (DEMA, 2013).

Table 1.10 selected incidents types that might cause major accidents and disasters in Denmark

Natural incidents	
Extreme weather phenomena	*Serious contagious diseases*
Hurricanes, strong storms and storm surges	Pandemic influenza
Heavy rain and cloudburst	Animal diseases and zoonoses
Man-made incidents	
Accidents (unintended actions, technical errors, etc.)	*Security threats (intentional actions)*
Transport accidents	Terrorist acts
Accidents with dangerous substances on land	Cyber-attacks
Marine pollution accidents	
Nuclear accidents	

Source: DEMA, 2013

[3] A new national risk profile has been conducted, please see *Nationalt Risikobillede 2017* at http://brs.dk/PLANLAEGNING/HELHED/NRB/Pages/default.aspx

[4] Decision No 1313/2013/EU of the European Parliament and of the Council on a Union Civil Protection Mechanism.

4.2 Finland

The disasters that Finland has dealt with in past years have mainly derived from storms, floods, mass shootings and transport accident (European Commission, n.d.-b). Urbanisation, interconnectedness, globalisation and shifting hazard patterns due to climate change cause challenges in Finland which generate threats when it comes to maintaining a high level of resilience. In order to tackle these challenges it is essential to reinforce the linkage of policy implementation and monitoring and the tackling of the risk perception gap across levels of government. Moreover, preparation for large-scale risks and increased prevention and risk reduction efforts should be strengthened further in national policy (UNIDSR, EC, OECD, 2014).

The national preparation for the 2015 National Risk Assessment was conducted in an inter-sectoral manner. The working group was led by the Ministry of the Interior, which holds an overall responsibility for civil protection, and supported by the Secretariat of the Security Committee. Other members of the working group were 10 ministries, the National Emergency Supply Agency, Bank of Finland, the Finnish Meteorological Institute, Regional State Administrative Agencies, and the Centre for Economic Development, Transport and the Environment. The 2015 National Risk Assessment is the first of its kind in Finland comparing the impacts and likelihood of different risks (Ministry of the Interior in Finland, 2016).

The National Risk Assessment in Finland is mainly based on two principles. Firstly, the NRA improves the capacity to distinguish unanticipated events that might jeopardise the life and health of people, result in financial and economic loss, cause environmental damage or harm the society. Secondly, pursuant to EU request the National Risk Assessment shall be drafted by its Member States[5] (Ministry of Interior in Finland, 2016).

During the National Risk Assessment process each branch of administration drafted “risk cards” of the most critical risks affecting them. This resulted in 60 “risk cards” from all branches. From these “risk cards” the working group selected 21 event scenarios that would have substantial impacts on people, the economy, the environment, or on the society. The selected scenarios were further divided into two categories, wide ranging events and regional events. The six wide ranging events can disrupt vital functions

[5]Decision No 1313/2013/EU of the European Parliament and of the Council on a Union Civil Protection Mechanism.

of society or critical infrastructure having considerable impact on society. The regional events can have an impact on a relatively small area causing limited disruption of critical infrastructure or vital functions or lead to a situation where international civil protection is necessary. The wide-ranging events are six in total and the regional events 15, see table 2.

Table 2. Finland: 21 event scenarios that could have substantial impacts on people, the economy, the environment or on the society

Wide-ranging events affecting society
1. Serious disruptions in energy supply
2. Risks in the cyber domain
3. Serious human infectious diseases, worldwide and in our vicinity
4. A security policy related crisis which directly or indirectly affects Finland
5. A severe nuclear accident in Finland or in our vicinity
6. A 100-year risk scenario for a solar storm
Serious regional events
1. Extensive rapid flooding in or around urban areas
2. A serious chemical accident or explosion at a plant handling dangerous substances
3. A major maritime accident
4. A major aviation accident
5. A major rail transport accident
6. A major road traffic accident
7. Several simultaneously occurring major forest fires
8. A major building fire at infrastructure critical to society
9. An extensive or extended disruption in water supply
10. A large-scale winter storm followed by a long cold spell
11. A severe thunderstorm
12. A terrorist act or terrorism targeting Finland
13. A serious act of targeted violence
14. Violent, large-scale civil disturbances
15. A mass influx of migrants

Source: Ministry of Interior in Finland, 2016.

4.3 Iceland

Iceland is located in the middle of the Mid-Atlantic Ridge, which separates the North American and Eurasian tectonic plates. The plates are constantly moving further apart causing frequent earthquakes which are most frequent in the southern and the northern part of Iceland (Ministry for Foreign Affairs in Iceland, n.d.). Other known risks are frequent volcanic eruptions and Iceland experiences a major volcanic event once in every five years on average. Furthermore, sub-glacial eruptions cause outburst floods in glacial rivers. Geothermal heat can also be a risk. Geysers and hot springs attract many tourists and in these areas steam explosions, dangerous gas and ground subsidence can cause accidents. Moreover, the climate in Iceland causes risks. Severe storms are frequent and ice and snow regularly causes disruption in road traffic. Some parts of the country are

prone to avalanches and when snow starts to melt in the spring the risk of floods is considerable (National Commissioner of the Icelandic Police, 2011).

State and local governments are responsible for mapping and analysing risks in cooperation with the National Commissioner of the Icelandic Police (Department of Civil Protection and Emergency Management). The 2011 Risk Assessment was conducted in collaboration between the Department of Civil Protection and Emergency Management, the 15 police and civil protection districts (became nine in 2015) and the 22 civil protection committees. Future risks were defined in every district. The analysis is based on the use of checklists and scenarios where possible risks are listed and evaluated in relation to frequency, severity, probability and consequences (National Commissioner of the Iceandic Police, 2011.).

The Risk Assessment was based on two methods. Firstly, the AS/NZS - 4360: 2004 risk management standard that is used in Australia and New Zealand. Secondly, it is based on ROS risk analysis which has been used in Norway, Denmark and Sweden (op.cit.).

The risks were assessed in relation to three main categorises, 1) natural hazards, 2) environment and health, and 3) infrastructure, vital societal functions and security, see table 3. Risks that are evaluated fairly likely are bolded in table 3.

Table 3. Possible risks in Iceland in relation to three main categorises, natural hazards, environment and health, and infrastructure, vital societal functions and security

Natural events
Storms and extreme weather
Earthquakes
Volcanic eruption
Glacial outburst floods
Avalanches
Landslide and Rock slide
Coastal flood
Tsunami
Flood in rivers and lakes
Geothermal heat
Sea ice
Climate change
Environment and health
Mass casualty traffic accidents
Road tunnels
Mass casualty sea accidents
Mass casualty aviation accidents
Fire (Wildfire and fire from hazardous substances)
Contamination and hazardous substances
Air pollution
Soil contamination
Nuclear accidents
Structures and land use planning
Pandemic influenza
Mass food poisoning
Animal diseases and zoonoses
Infrastructure, vital societal functions and security
Major disruptions in land transport
Major disruptions in sea transport
Major disruptions in air transport
Shortage of water supply
Shortage of hot water supply for heating
Shortage of energy supply
Dams and erosion
Failure in sewer system
Failure in telecommunication
Shortage of food safety and supply
Risks regarding tourists' safety
Risks regarding big social gatherings
Risks regarding riots, vandalism and terrorism

Source: National Commissioner of the Icelandic Police, 2011

4.4 Norway

Landslides and floods are among the most common natural hazards causing destruction in Norway. In past years the country has also been facing chemical and biological accidents, infrastructure accidents, oil pollution and other hazardous materials spills, and large fires to name a few (European Commission, n.d.-c). In July 2011 Norway was hit by a car bomb attack in Oslo and mass shooting at the island Utoya where the youth division

of the Labour Party (AP) held their annual meeting. A single perpetrator carried out both attacks, killing 77 people (Sollid et al., 2012)

The Norwegian Directorate for Civil Protection (DSB) is responsible for having a general overview of risk and vulnerability in Norwegian society. The latest National Risk Analysis, from 2014, gives an overview of different risk areas and contains analyses of specific disaster scenarios that would affect Norwegian society[6]. The National Risk Analysis is also intended as a contribution towards improving national risk awareness. The National Risk Analysis is not a complete overview of risk and vulnerability in Norway but emphasises serious events that would have great consequences for society (DSB, 2014).

The National Risk Analysis 2014 is based on qualitative risk analysis of serious scenarios based on expert assessment. These events have low likelihood but if they should actually occur, they will entail great challenges for Norwegian society. The analysis describes 15 different risk areas and contains 20 analyses of specific disaster scenarios. The 15 different risk areas are arranged into three main categories, as depicted in table 4.

Table 4. Risk areas and disaster scenarios in Norway arranged into three main categories

Natural events	
Risk area	***Scenario***
Extreme weather	Storm in Inner Oslo Fjord
	Long-Term Power Rationing
Flooding	Flooding in Eastern Norway
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	
Risk area	***Scenario***
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	
Risk area	***Scenario***
Terrorism	Terrorist Attack in a City
Security policy crises	Strategic Attack
Cyberspace	Cyber Attack on Financial Infrastructure
	Cyber Attack on Electronic Communications Infrastructure

Source: DSB, 2014

[6] DSB has also conducted several area-specific risk analysis, see https://www.dsb.no/lover/risiko-sarbarhet-og-beredskap/artikler/nasjonalt-risikobilde/

4.5 Sweden

In past years it has mainly been flooding, winter storms, landslides, forest fires and ice floes that have struck Sweden (Bakken and Rhinard, 2013; European Commission, n.d.-d). The country is not prone to earthquakes or volcanic eruptions due to its geographical location. Sweden has faced shipping disasters with major casualties and injuries as well as disasters due to major fires, for example the discotheque fire in 1998 (Socialstyrelsen, 2009) and the wild fire in 2014 (The Government Offices of Sweden, 2015). Sweden has during the last years experienced deadly violence in school settings as well as terroristic violence (Cuadra, 2015).

The Swedish Civil Contingencies Agency (MSB) is responsible for conducting an analysis of risks and vulnerabilities in the society. The National Risk- and capability assessment (*Risker och förmågor 2014)*, from 2014, provides an overview of identified risks and vulnerabilities which may have significant consequences for Swedish society. The Swedish Civil Contingencies Agency does not assess whether these are the most serious risks countrywide but compiles the risks and vulnerabilities that state authorities have identified and the consequences that they believe that they can lead to (MSB, 2015).

The 2014 National Risk- and capability assessment includes risks and vulnerability assessments from state authorities along with the risks and vulnerabilities that the Swedish Civil Contingencies Agency has analysed in three scenario analyses, namely solar storm, mud slide and sulfuric acid mist. The state authorities identified more than 1,000 risks and in order to gain a comprehensive overview of these risks the Swedish Civil Contingencies Agency sorted the risks into different categories and sub categories, as depicted in table 5 (MSB, 2015).

Table 5. Risk and vulnerabilities in Sweden sorted into categories and sub categories

Natural events
Storms
Flooding (including skyfall)
Mud slide
Wildland fire (Forest fire)
Heat wave
Serious contagious diseases
Pandemic influenza
Animal diseases and zoonoses
Emissions of hazardous substances
Chemical, biological, radiological, nuclear, and high yield explosives (CBRNE)
Act of crime
Threats
Sabotage
Terrorist acts
School shootings
Cyber threats
Energy supply interruption
Electricity supply interruption
Water supply interruption
Food supply interruption
Interruption in transport
Interruption in IT system
Interruption in electronic communication
Interruption in technical support in municipalities
Interruption in water supply or water contamination
Interruption in electronic communication
Landline telephone interruption
Mobile telephone interruption
Internet interruption
TV interruption
Radio interruption

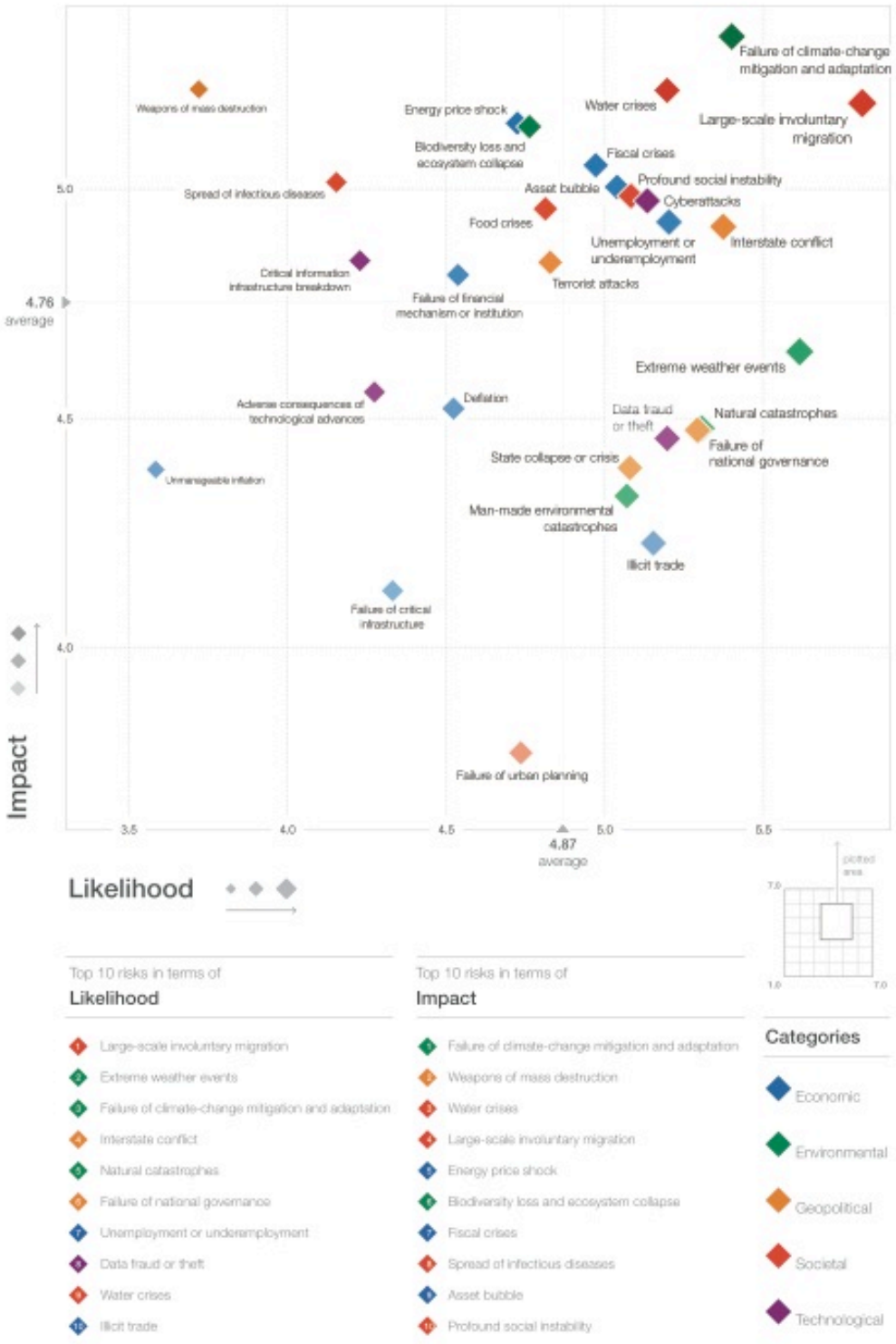
Source: MSB, 2015

The National Risk and Capacity Assessment 2017 (MSB 2017) concluded that the challenges in terms of threats are changing and consequently underlines antagonistic threats such as terrorism, cyberattacs as well as illegitimat endeavors to gain influence (for example over political elections).

In sum: Risk analysis in the Nordic countries

The list of risks is long but it maintains in all cases some main categories such as natural events, diseases, emissions of hazardous substances, acts of crime, interruption of infrastructures, including cyber attacks and threats. Social disasters are also entering the lists e.g. in the case of Finland, a mass influx of migrants and violent large-scale civil disturbances are also listed. As mentioned in the beginning of the section the countries apply quite different methodologies in their work but they are all applying all-hazards

approach to national risk assessment. The fact that the reports differed in time of publication, the Icelandic one being the oldest from 2011, might explain why the reports take only a few social disasters into account. This is noteworthy in light of the results of the World Economic Forum risk report from 2016 that is based on survey among 750 experts and decision makers from business, academia, civil society and public sector (World Economic Forum, 2016). The respondents believe that failure of climate change mitigation and adaption is the most important risk in the nearest future, followed by weapons of mass destruction, water crisis and involuntary mass migration. The report applies five categories of risks: economic, environmental, geopolitical, societal and technological. The following figure 3 shows the likelihood and the impact of the identified risks.

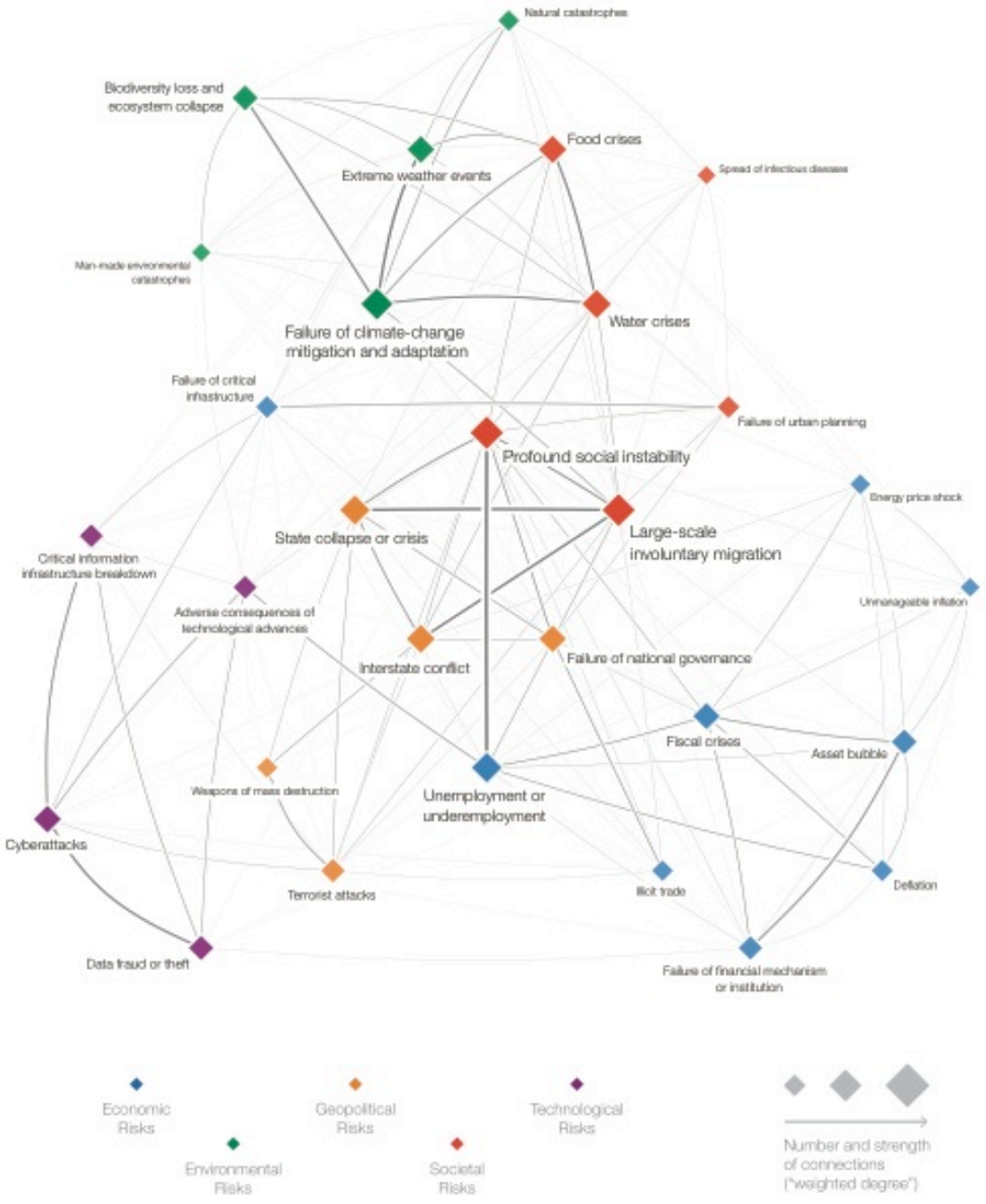


Source: Global Risks Perception Survey 2015.
Note: Survey respondents were asked to assess the likelihood and impact of the individual risks on a scale of 1 to 7, 1 representing a risk that is not likely to happen or have impact, and 7 a risk that is very likely to occur and have massive and devastating impacts. See Appendix B for more details. To ensure legibility, the names of the global risks are abbreviated; see Appendix A for the full name and description.

Source: World Economic Forum, 2016, Figure 1.

Figure 3. The Global Risks Landscape 2016

The report also presents the Interconnections of the identified risks. Figure 4 clearly shows that the risks are interconnected and might contribute to other risks.



Source: Global Risks Perception Survey 2015.
Note: Survey respondents were asked to identify between three and six pairs of global risks they believe to be most interconnected. See Appendix B for more details. To ensure legibility, the names of the global risks are abbreviated; see Appendix A for the full name and description.

Source: World Economic Forum, 2016, Figure 2.

Figure 4. The Global Risk Interconnection Map 2016

The local social services are dealing with everyday crisis of individuals, families and communities (Cuadra, 2015) and as discussed in chapter 2 the literature has shown clearly how the vulnerable groups that often seek help and support from social services are the ones that are most vulnerable in times of disasters (Eydal et al., 2016 for overview). Hence in order to increase the risk-resilience of individuals, families and communities it is important to address the capabilities of the local social services and make use of their expertise on vulnerable groups and know how in regards to user- involvement and empowerment (Dominelli, 2015). Furthermore the social services as well as other service providers in the Nordic welfare system are already working with the management of many of the risks presented in figure 1 and 2 and therefore have expert knowledge on these. Hence social services might not only be an important addition to the Emergency Management in terms of preparedness and responses but also in regards to identifying and analysing future risks.

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9. CONCLUSION

As the local social services in all the Nordic countries provide the inhabitants with basic security their roles become of vital importance in times of disasters. The social and welfare services possess knowledge about the most vulnerable citizens and their needs; hence it has an important role to play in emergency management in terms of preparedness, of increasing resilience, and in responding to disasters. The constructed case of Winterland presented in Chapter 2 shows clearly how the so-called crunch model is at play. When a disaster strikes the most vulnerable who also have few resources to enhance their recovery are hardest it. Thus the level of resilience among the individuals, families and communities is defining for the outcomes of a disaster.

In all the Nordic countries the social services have the legal obligation to conduct a contingency plan. The national risk analyses provide a road map for the social services in the Nordic countries on what kind of risks they could be facing in near future. The five Nordic countries have all defined risks that derive both from natural disasters and/or human doing, but there is also a growing emphasis on social risks. Thus the expertise within the social services can also be an important resource for the future risk analyses, since they have expert knowledge of the social risks and the responses.

The crunch model is also relevant in regards to the fact that different risks come at play at the same time, hence as an event such as a snow storm unfolds infrastructure failures that have serious consequences that might lead to new risks, e.g. in terms of health problems and even deaths. Hence the overview of the World Forum, presented above (Figure 2) on the interconnections of risks is an important addition to the national risks analysis for the social services when identifying their roles in risk management and contingency planning.

It is the sincere hope of the authors of this report that it contributes to the contingency planning of the local social services. We would like to stress the importance of gaining more knowledge on how local social services have responded in previous crisis as well as knowledge about their contingency planning. Such research would be valuable

for enhancing further the learning between countries and municipalities in the Nordic region.

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