



National risk assessment 2018

Internal security | Publications of the Ministry of the Interior 2019:9

Publications of the Ministry of the Interior 2019:9

National risk assessment 2018

Ministry of the Interior, Helsinki 2019

Ministry of the Interior

ISBN: 978-952-324-249-4

Cover photo: Shutterstock

Layout: Government Administration Unit, Publications

Helsinki 2019

Description sheet

Published by	Ministry of the Interior		20.1.2019
Authors	Taito Vainio (chair), Ministry of the Interior; Jussi Korhonen (vice-chair), Ministry of the Interior; Jussi Aarnio, Ministry for Foreign Affairs; Matti Aitta, Ministry of Justice; Jussi Ylimartimo, Ministry of Defence; Sampo Kemppainen, Prime Minister's Office; Mika Kaijamo, The National Emergency Supply Agency; Jari Kiehlenniva, Secretariat of the Security Committee; Kimmo Kohvakka, Regional State Administrative Agency for Southern Finland; Heli Nedenström, Ministry of Education and Culture; Magnus Nyström, Ministry of the Environment; Jyrki Pohjolainen, Ministry of Economic Affairs and Employment; Ari-Juhani Punkka, Finnish Meteorological Institute; Merja Rapeli, Ministry of Social Affairs and Health; Tatu Giordani, Ministry of Transport and Communications; Riitta Ukkonen, Ministry of Agriculture and Forestry; Jaakko Weuro, Ministry of Finance; Tapani Rossi, Centre for Economic Development, Transport and the Environment for North Ostrobothnia; Simo Wecksten, Finnish National Rescue Association; Jouni Pousi (ed.), Ministry of the Interior		
Title of publication	National risk assessment 2018		
Series and publication number	Publications of the Ministry of the Interior 2019:9		
Register number	SMDno-2017-1447	Subject	Internal security
ISBN PDF	978-952-324-249-4	ISSN (PDF)	2490-077X
Website address (URN)	http://urn.fi/URN:ISBN:978-952-324-249-4		
Pages	69	Language	Finnish
Keywords	Risk assessment, threat scenario, disruption, critical social functions and infrastructures		
Abstract The drafting of Finland's national risk assessment is based on Decision No. 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism. In accordance with Article 6 of the Decision, Member States must develop risk assessments at the national or appropriate sub-national level and submit a summary of the relevant elements to the Commission every three years. The first national risk assessment was drafted in 2015. The Union Civil Protection Mechanism, which serves as the basis for the national risk assessment, encompasses the protection of people, the environment and property against all kinds of natural and man-made disasters, both within and outside the Union. Every effort has been made to use existing risk assessments or equivalent products and processes produced by other actors in drafting the national risk assessment. In practice, the national risk assessment is a harmonised summary of proprietary risk assessments of different actors. Various administrative branches have specified threat scenarios and serious disruptions affecting critical social functions and infrastructures at the national level. The threat scenarios and disruptions specified by each administrative branch include verbal descriptions of the threat or threats on which the threat scenarios and disruptions are based, the threat target, course of action and the concatenation and recurrence of faults and disruptions. Change trends in the probability of threat scenarios and serious disruptions were assessed. An impact assessment was conducted to determine whether each threat scenario and serious disruption would have a direct or indirect impact on critical social functions and infrastructures.			
Publisher	Ministry of the Interior		
Distributed by/ publication sales	Online version: julkaisut.valtioneuvosto.fi Publication sales: julkaisutilaukset.valtioneuvosto.fi		

Kuvailulehti

Julkaisija	Sisäministeriö	20.1.2019	
Tekijät	Taito Vainio SM (pj), Jussi Korhonen SM (vpj) Jussi Aarnio UM, Matti Aitta OM, Jussi Ylimartimo PLM, Sampo Kemppainen VNK, Mika Kaijamo HVK, Jari Kielenniva Turvallisuukskomitean sihteeristö. Kimmo Kohvakka ESAVI, Heli Nedenström OKM, Magnus Nyström YM, Jyrki Pohjolainen TEM, Ari-Juhani Punkka Ilmatieteen laitos, Merja Rapeli STM, Tatu Giordani LVM, Riitta Ukkonen MMM, Jaakko Weuro VM, Tapani Rossi Pohjois-Pohjanmaan ELY, Simo Wecksten SPEK, Jouni Pousi SM (toim.)		
Julkaisun nimi	Kansallinen riskiarvio 2018		
Julkaisusarjan nimi ja numero	Sisäministeriön julkaisuja 2019:9		
Diaari/hankenumero	SMDno-2017-1447	Teema	Sisäinen turvallisuus
ISBN PDF	978-952-324-249-4	ISSN PDF	2490-077X
URN-osoite	http://urn.fi/URN:ISBN:978-952-324-249-4		
Sivumäärä	69	Kieli	suomi
Asiasanat	Riskiarvio, uhkamalli, häiriötilanne, yhteiskunnan elintärkeät toiminnot		
Tiivistelmä Suomen kansallisen riskinarvion laatiminen perustuu Euroopan parlamentin ja neuvoston päätökseen unionin pelastuspalvelumekanismista (N: o 1313/2013/EU). Päätöksen 6 artiklan mukaan jäsenvaltioiden on kehitettävä riskinarviointeja kansallisella ja asianmukaisella paikallisella tasolla ja annettava komissiolle yhteenveto niiden keskeisistä osista joka kolmas vuosi. Ensimmäinen kansallinen riskiarvio tehtiin vuonna 2015. Kansallisen riskiarvion laatimisen taustalla oleva unionin pelastuspalvelumekanismi kattaa ihmisen, ympäristön ja omaisuuden suojelun unionin alueella ja sen ulkopuolella tapahtuvissa kaikenlaisissa luonnon ja ihmisen aiheuttamissa onnettomuuksissa (civil protection). Kansallisen riskiarvion laadinnassa on hyödynnetty mahdollisimman paljon jo tehtyjä eri toimijoiden riskiarvioita tai vastaavia tuotteita ja prosesseja. Käytännössä kansallinen riskiarvio on yhteen sovitettu kooste eri toimijoiden omista riskiarvioista. Eri hallinnonalat ovat valinneet yhteiskunnan elintärkeisiin toimintoihin kansallisesti vaikuttavia uhkamalleja ja häiriötilanteita. Hallinnonaloilla tehdyistä uhkamalleista ja häiriötilanteista kuvattiin sanallisesti uhkamallin ja häiriötilanteen taustalla oleva uhka tai uhat, uhkan kohde, toteutumistapa ja vikojen ja häiriöiden ketjuuntuminen ja kertautuminen Uhkamallien ja häiriötilanteiden osalta arvioitiin niiden todennäköisyyden muutostrendi. Vaikutusarviointi tehtiin siten, että arvioitiin kunkin uhkamallin ja häiriötilanteiden osalta, onko sillä välitön vai välillinen vaikutus yhteiskunnan elintärkeisiin toimintoihin.			
Kustantaja	Sisäministeriö		
Julkaisun jakaja/myynti	Sähköinen versio: julkaisut.valtioneuvosto.fi Julkaisumyynti: julkaisutilaukset.valtioneuvosto.fi		

Presentationsblad

Utgivare	Inrikesministeriet		20.1.2019
Författare	Taito Vainio IM (ordf.), Jussi Korhonen IM (vice ordf.) Jussi Aarnio UM, Matti Aitta JM, Jussi Ylimartimo FSM, Sampo Kemppainen SRK, Mika Kaijamo FBC, Jari Kielenniva Säkerhetskommitténs sekreteriat. Kimmo Kohvakka Regionförvaltningsverket i Södra Finland, Heli Nedenström UKM, Magnus Nyström MM, Jyrki Pohjolainen ANM, Ari-Juhani Punkka Meteorologiska institutet, Merja Rapeli SHM, Tatu Giordani KM, Riitta Ukkonen JSM, Jaakko Weuro FM, Tapani Rossi närings-, trafik- och miljöcentralen i Norra Österbotten, Simo Wecksten SPEK, Jouni Pousi IM (red.)		
Publikationens titel	Nationell riskbedömning 2018		
Publikationsseriens namn och nummer	Inrikesministeriets publikationer 2019:9		
Diarie-/ projektnummer	SMDno-2017-1447	Tema	Inre säkerhet
ISBN PDF	978-952-324-249-4	ISSN PDF	2490-077X
URN-adress	http://urn.fi/URN:ISBN:978-952-324-249-4		
Sidantal	69	Språk	finska
Nyckelord	Riskbedömning, hotmodell, störningssituation, samhällets vitala funktioner		
Referat Utarbetandet av Finlands nationella riskbedömning är baserad på Europaparlamentets och rådets beslut om en civilskyddsmekanism för unionen (nr 1313/2013/EU). Enligt artikel 6 i beslutet ska medlemsstaterna utarbeta riskbedömningar på nationell eller lämplig subnationell nivå samt tillhandahålla kommissionen en sammanfattning av relevanta delar av dessa vart tredje år. Den första nationella riskbedömningen gjordes 2015. Unionens civilskyddsmekanism, som ligger till grund för utarbetandet av den nationella riskbedömningen, omfattar skydd av människor, miljö och egendom inom och utanför unionen vid alla typer av naturkatastrofer och olyckor som orsakas av människor (civil protection). Vid utarbetandet av riskbedömningen har man i största möjliga mån utnyttjat befintliga riskbedömningar av olika aktörer eller motsvarande produkter och processer. I praktiken är den nationella riskbedömningen en sammanfattning av olika aktörers egna riskbedömningar. Olika förvaltningsområden har valt ut hotmodeller och störningssituationer som påverkar samhällets vitala funktioner nationellt. När det gäller de hotmodeller och störningssituationer som tagits fram inom förvaltningsområdena beskrev man det eller de hot som låg till grund för hotmodellen eller störningssituationen, föremålet för hotet och hur hot eller störningar realiseras och upprepas och hur felkedjor uppstår. För hotmodellernas och störningssituationernas del bedömdes trender med avseende på sannolikheten för att hotet eller störningen ska inträffa. I konsekvensanalysen bedömde man om hotmodellerna och störningssituationerna har direkt eller indirekt inverkan på samhällets vitala funktioner.			
Förläggare	Inrikesministeriet		
Distribution/ beställningar	Elektronisk version: julkaisut.valtioneuvosto.fi Beställningar: julkaisutilaukset.valtioneuvosto.fi		

Contents

1	Introduction	9
2	Grounds of preparing Finland's national risk assessment	11
2.1	The methods and the process applied in drafting the risk assessment.....	12
2.2	Sub-national risk assessment	12
3	Transformation of the security environment	14
3.1	Turmoil of the operational environment	14
3.2	Hybrid influencing sets challenges.....	16
3.3	Development and challenges of the digital society.....	17
3.4	Weather and climate risks impact the society and economy	18
4	Threat scenarios and disruptions relating to the security of the society	22
4.1	Information operations	23
4.2	Political, financial and military pressure	27
4.3	Use of military force.....	29
4.4	Terrorism and other activities posing a threat to society.....	32
4.4.1	Large-scale immigration	32
4.4.2	Terrorist act targeting the structures of the society or large crowds	34
4.4.3	Violent, large-scale civil disturbances.....	36
4.5	Disruption of the public economy	38
4.6	Disruption of the financial system.....	39
4.7	Power supply disruptions.....	42
4.7.1	Major disruption in power supply	42
4.7.2	Severe disruption in the availability of fuels.....	45
4.8	Disruptions in telecommunications and information systems – cyber threats	47
4.8.1	Severe disruptions in communications networks and services	47
4.9	Disruptions in logistics	50
4.10	Disruptions in health security	52
4.10.1	Antimicrobial drug resistance.....	52
4.10.2	Pandemic influenza or similar widespread epidemic.....	55
4.10.3	Highly infectious severe animal disease.....	57
4.10.4	Plant hazards – plant disease epidemic.....	59

4.11 Water supply disruptions.....	60
4.12 Disruptions in food supply.....	61
4.13 Large-scale accidents.....	63
4.13.1 Maritime multi-sector accident	63
4.13.2 Severe nuclear power plant accident in Finland or Finland's neighbouring areas	66

APPENDICES	69
-------------------------	----

1 Introduction

Preparedness refers to activities ensuring that all tasks can continue with minimum interruptions and that the required exceptional measures can be performed during disruptions occurring in normal conditions and during emergencies. The aim of preparedness at national level is to safeguard society's vital functions in accordance with the principle of the rule of law.

The aim of preparedness is to prevent accidents and disruptions, to prepare for the measures required during an accident or disruption and plan the recovery process. Preparedness planning and cooperation are the duty of the responsible and competent authorities.

The preparation of Finland's national risk assessment is based on Decision No 1313/2013/ EU of the European Parliament and of the Council on a Union Civil Protection Mechanism. In accordance with Article 6 of the Decision, Member States shall develop risk assessments at national or appropriate sub-national level and make available to the Commission a summary of the relevant elements thereof every three years. The first national risk assessment was prepared in 2015.

In addition to fulfilling the obligation imposed by EU legislation, the aim in Finland is to be able to foresee sudden severe events affecting Finland. The occurrence of such events will cause significant damage affecting the lives or health of people, economy, environment and society.

Comprehensive Security is a Finnish preparedness cooperation model in which the vital functions of society are looked after through cooperation between the authorities, business community, organisations and citizens. The fact that the comprehensive security cooperation model applicable in Finland covers all levels and actors of society is its strength. Individual citizens also play an important role in independent preparedness and in enhancing the resilience of Finnish society.

The vital functions of the society extend into the statutory tasks of several parties cross-sectorally, and partially to areas for which it is not possible to specify a single responsible party. Vital functions are the starting point of preparedness planning at all operational levels.



Figure 1. Vital functions of the society

In addition to the national risk assessment, sub-national risk assessments will be drafted at the same time. The aim is for the national risk assessment to specify the nationally significant risks that need not be re-assessed at the sub-national level.

The aim of the sub-national risk assessment is to focus on regionally significant risks whose management requires activities deviating from the norm and which will cause significant impacts at the regional level if they materialise. Disruptions, such as floods, storms and forest fires, are often sub-national, but several simultaneous large-scale events may lead to a national disruption.

2 Grounds of preparing Finland's national risk assessment

The Union Civil Protection Mechanism underlying the preparation of the national risk assessment covers people, the environment and property against all kinds of natural and man-made disasters, both within and outside the area of the Union (civil protection).

The national risk assessment aims to take into consideration the impact of disruptions on the vital functions of the society and identify risks that may have a wider national impact. This means risks that have to be managed through resource coordination between several authorities – regionally or nationally at the very least, or even by requesting assistance from other countries. The focus is on internal risks and risks affecting the immediate neighbouring area.

The National Risk Assessment project was launched on 30 October 2017. The working group was led by the Ministry of the Interior, supported by the Secretariat of the Security Committee. The Committee was also responsible for issuing guidelines for the work.

Representatives of the following parties have taken part in the working group: Ministry of the Interior, Ministry of Justice, Secretariat of the Security Committee, Prime Minister's Office, Ministry of Transport and Communications, Ministry of Education and Culture, Ministry of the Environment, Ministry of Social Affairs and Health, Ministry for Foreign Affairs, Ministry of Economic Affairs and Employment, Ministry of Defence, Ministry of Agriculture and Forestry, Ministry of Finance, National Emergency Supply Agency and the Finnish Meteorological Institute. In addition, the Regional State Administrative Agency for Southern Finland acted on behalf of all regional state administrative agencies in the same vein as the Centre for Economic Development, Transport and the Environment of North Ostrobothnia represented all other Centres. The Finnish National Rescue Association SPEK represented NGOs in the work.

2.1 The methods and the process applied in drafting the risk assessment

The process of drafting the National Risk Assessment tapped into different actors' existing risk assessments or similar products as processes as much as possible. In practice, the National Risk Assessment is an amalgamation of the different actors' individual risk assessments. Different branches of administration chose threat scenarios and disruptions that impact the vital functions of the society at the national level.

Of the threat scenarios and disruptions drafted by the administrative branches, the threat or threats behind the threat scenario and disruption, target of the threat, method of materialisation and concatenation and recurrence of disruptions were described verbally.

The competent ministry was responsible for writing its own threat scenarios and disruptions by forming a 'writing group'. The writing groups also took advantage of the expert opinions in the ministries' respective branch of administration. The writing groups' efforts were combined and edited into their final form by the national risk assessment working group.

With regard to the threat scenarios and disruptions, the change trend of their likelihood was assessed. The impact assessment was made by assessing whether each threat scenario and disruption has a direct or indirect impact on vital functions.

EU guidelines were used in drafting the National Risk Assessment. In addition, corresponding national risk assessments from other countries were taken into account in the planning phase.

2.2 Sub-national risk assessment

The sub-national risk assessments were prepared as a separate project simultaneously with the national risk assessment. The sub-national risk assessments were drafted cross-sectorally so that the region's municipalities, authorities, businesses and organisations were represented in the working groups. The representatives utilised the expertise and insights of their communities and reference groups extensively.

The aim is not to identify and list all possible scenarios in the region, but to choose the most significant threats or disruptions shared by the operators of the region. Nationally significant threats are not to be assessed again at the sub-national level; rather, they are ones that are automatically taken into account in each region.

The results of the sub-national risk assessment and a description of the drafting of the assessment are compiled into a written report distributed to the operators in the region for use and, if necessary, to other stakeholders. The aim is for the risk assessment on the whole to be comprised of national and sub-national risk assessments, which are used in joint preparedness, but additionally of each operator's own risk assessments using the national and sub-national risk assessment as the shared basis of preparedness. The outcome is that the most significant risks have been identified and assessed cross-sectorally.

3 Transformation of the security environment

In the interdependent world, global trends are part of Finland's operating environment, and they involve risks and threats. Foreseeing, utilising and adapting to them can also provide Finland with global opportunities.

Climate change, demographic development, accelerating urbanisation, migration between and within states, poverty, youth unemployment, food security, scarcity of natural resources and change in the nature of conflicts are examples of intertwined questions. Epidemics and pandemics are also security threats.

The transformation of the security environment is also associated with phenomena that can be referred to as hybrid operations. The advance warning period of security threats has shortened, which sets challenges for decision-making and the preparedness of the authorities as well as fluent cooperation between authorities.

3.1 Turmoil of the operational environment

Finland is closely linked to the turmoil of the global operational environment, both to its positive and worrying trends. Both global megatrends and regional development are reflected directly in Finland's international position as well as the wellbeing and safety of Finns. As an EU Member State, Finland is committed to the EU's joint policies.

Across the world, authoritarian and semi-authoritarian governments and several fragile democracies restrict the activities of democratic institutions and restrict fundamental freedoms and human rights, freedom of expression and social media use. At the same time, the lives of millions of people around the world have improved and poverty has decreased through growing educational opportunities, longer life expectations and technological development. However, development has been imbalanced.

The prioritisation of national interest and traditional rhetoric of power politics have returned to international relations. It seems that the operating capacity of international institutions remains limited, considering the expectations, and both states and individuals have reservations about their ability to solve problems in world politics.

If the current development continues, economic wellbeing will polarise between different demographic groups and regions. Social, cultural and health-related polarisation will also challenge the safe wellbeing society. Inequality and marginalisation are the biggest background factors of conventional threats to security, such as crime and becoming a victim of crime. In the marginalisation phenomenon, diverse problems, such as socioeconomic, substance abuse and mental health issues, often accumulate among the same people. Young males commit proportionally the most crimes, and the share of young adults at risk of marginalisation is increasing. In Finland, the average age of the population is increasing the fastest of the EU countries, and the ageing of the population is not spread equally throughout the land; the population of the sparsely populated areas is ageing. In economically well-off growth centres, the challenge is in increasing wellbeing and income inequality at the local level, which can lead to increasing inequality between residential areas.

The physical functional capacity of Finns has seen a downward trend since the 1970s. Should this trend continue, poor physical functional capacity will increase the risk of marginalisation, impair the productivity of work and increase medical costs. This will also have direct negative effects on the performance of military national defence.

The Finnish society is becoming more diverse as the joint effect of several factors. Lifestyle differences between different generations are increasing. International ideological groups and subcultures are present in Finland through information networks. The role of authority figures is changing and power is distributed in a new way.

Increasing diversity of the population as the result of migration increases the number of value groups in the society. The diversity of value communities is an asset that can enrich the Finnish society, but actual or perceived fragmentation of values can also separate groups of people and increase confrontations and conflicts between the groups. A society that is fragmented in terms of values is also more vulnerable to information operations based on false information, aiming to accelerate confrontations.

3.2 Hybrid influencing sets challenges

The Security Strategy for Society specifies hybrid influencing as action in which the aim of the instigator is to achieve its aims by using a multitude of complementary methods and exploiting the weaknesses of the targeted community.

Finland is subjected to hybrid influencing that can destabilise the society in new and unforeseen ways. One of the key aims is to influence political decision-making. It can concern e.g. building economic dependencies, which could restrict the targeted state's freedom of movement in future. The cyber domain and social media provide state and non-state actors with an environment in which they, alongside collecting information, aim to influence the internal affairs of the targeted country, such as the stability of the society, citizens' opinions, balance of political power and alliances. Trolling and dissemination of disinformation aim to artificially divide citizens' opinions in the targeted country, increase discord and decrease trust in the authorities.

Fixed assets can also be utilised as part of hybrid influencing. Properties can be acquired in strategic locations with the aim of gaining a foothold in Finland, decreasing the operational prerequisites of the authorities, promoting the use of the properties for illegal intelligence operations or otherwise supporting the objectives of the foreign state. Economic methods, such as financing, investments and trade, can also be used for pursuing influence and dependence that will later restrict the targeted state's freedom of action.

Hybrid influencing aims to drive a wedge between different interest groups, create a poisonous atmosphere within the population and weaken the people's trust in public institutions. The business community that supports the operations of the society, with its companies, cash flows and employees, is a target just as much as citizens' opinions. Extensive influencing creates a fertile soil in which the entire nation's tolerance decreases and other hybrid operations can be realised more effectively.

It is characteristic of hybrid influencing to take place in the grey zone between the legal and illegal, thereby often remaining beyond the reach of ordinary security measures of the authorities. Hybrid action can take place under the protection of the freedom of speech and assembly, which makes it difficult for the authorities to both maintain the cornerstones of the democratic state and prevent harmful influencing.

Both Finland and the rest of Europe have awoken to the risks of hybrid influencing. Free communication is a strength, but also a way of attempting to influence. There have been attempts to influence election results, social media has been manipulated and public services have been crippled through cyber attacks.

External and internal security are strongly intertwined in hybrid threats, and it is impossible to draw a clear distinction between the two. Hybrid refers to the diversity, sudden nature and increasingly extensive range of means of conflicts.

Some of the highly capable states are ready to act in violation of laws or contrary to the norms of international law and responsible behaviour of states.

Often, the underlying motive of the risk scenarios described in this National Risk Assessment can be hybrid influencing or preparing for future hybrid influencing.

3.3 Development and challenges of the digital society

Information and communications technology and related services are transforming the operations and power structures of the society in a revolutionary way. Digitalisation facilitates numerous technological innovations:

- artificial intelligence, robotics and other smart technologies
- internet of things
- smart automation of traffic
- utilisation of big data
- positioning and time information systems of automated traffic.

The development of technology allows us to make our lives easier and our operating methods safer, more efficient and possibly more ecological. At the same time, services increasingly depend on the uninterrupted operation of communications services, communications networks, radio frequencies and information systems. Any disruptions can also affect the provision of services which are key to the operation of the society. This is also applies to things, devices and public means of transport, an increasing share of which are connected to the internet and the operation of which is controlled through the processing of digital data.

The functioning of digital services also depends strongly on functional international connections. Several IT services depend on foreign data centres. This way, the society is dependent on international communications connections and infrastructure.

The importance of the reliability, security and data protection of digital services and systems is in fact increasingly emphasised in ensuring the uninterrupted operation of the society.

Cybercrime, large-scale violations of data protection and other disruptions associated with data security by either criminals or state operators are likely to contribute to a lack of trust among the users of services. This can also lead to a general erosion of trust in the services of the digital society and actions of the authorities.

The interdependencies of systems and organisations will increase hand in hand with digitalisation. As cloud services and centralisation of systems become more commonplace, the multiplicative effects of individual system disruptions can be significant due to the concatenation of faults and disruptions. Failures, disruptions or vulnerabilities of jointly used electronic platforms can simultaneously affect the availability of the services and confidentiality or integrity of data of several organisations.

There is also a risk of combining publicly available position data and other information with large-scale malicious intent, which can have unforeseen impacts on the society.

Interdependency is also increased by an increasing number of devices being connected to the internet (internet of things). More and more functions are controlled digitally, and therefore disruptions in electronic services can also compromise physical services, such as water supply. The operating capacity of the digital society is also threatened by strong space weather storms. The most recent storm causing significant impacts took place in November 2003, causing a 90-minute blackout in Southern Sweden. In addition, malfunctions were observed in numerous satellites, and one satellite broke down.

A strong space weather storm or intentional interference may cause significant direct impact on satellite-based data transfer and satellite positioning. This would impact, inter alia, transport logistics, emergency services and aviation. The situation could lead to the air space being closed temporarily, for example.

3.4 Weather and climate risks impact the society and economy

Rapid climate warming has many direct and indirect impacts on people, the environment, economy and society. It increases the risks caused by previously known weather and climate-related hazards by changing the frequency and intensity of these phenomena and their typical time of occurrence. In addition, it creates new, slower-emerging direct risks to Finnish ecosystems, economy, health security and infrastructure.

Floods, storms and forest fires are often sub-national, but several simultaneous large-scale events may lead to a national disruption.

In recent years, forest damage and long blackouts have been the most visible impact of weather phenomena in Finland. The risk of forest damage will increase further as climate change progresses. Even though climate models indicate that the wind speeds of low-pressure storms will not increase significantly, the estimated decrease in ground frost will increase the exposure of forests to wind damage and make harvesting trees more difficult. Snow load on trees and power cables is estimated to increase in the areas where snow damage is the most common already now.

Disease and insect damage becoming more common due to the decreased immunity of trees is a significant risk to the forest industry. Most fungal diseases also benefit from climate change. The biggest individual risk to forests is the spreading of invasive pests and pathogens due to international plant trade combined with climate change. The forest sector has significant effects on national and sub-national economy, so large-scale damage and changes in Finnish forests may have economic and social impacts. In addition, cultural changes can become major as ecosystems change.

Agricultural climate risks are a major factor at the national level. Extreme weather phenomena, such as long spells of high temperatures and drought, rainstorms and floods, cause additional problems to agriculture. Moreover, new plant diseases, pest and weed species are expected to enter Finland with climate change. Local self-sufficiency of agricultural will continue to be important, especially in global emergency conditions, such as if import flows should grind to a halt.

Drying up of top soil in the spring and extremely dry summers may become more common. Drought in the growing season may cause significant damage to forestry and agriculture. Prolonged dry periods also increase the risk of forest fires. The number of forest fire warning days is expected to increase by 5–10 days from the current level by the end of the century. Long drought can also considerably interfere with the water supply of communities and industry and also impair the hydroelectric power generation and possibilities of power control in the national grid.

As the climate gets warmer, also days on which simultaneous strong winds, high temperature and low humidity increase the risk of fires spreading will become more common. This increases the risk of extensive forest fires. The risk of forest fires will increase also elsewhere in the northern hemisphere, which increases the drifting of particulates to Finland and may cause health hazards among risk groups.

The risk of sea, inland water and stormwater floods will also change as the climate gets warmer. The sea level will rise in the Gulf of Finland and storms may become stronger, which will increase the risk of sea floods. The effect depends significantly on the part of the coast. Correspondingly, the change in the inland water risk is location-specific; in

places, it will decrease due to there being less snow, while the risk of flooding will increase in e.g. large central lakes and the deltas of their outlets. Inland water flood risk may also be increased by ice and hanging dam situations.

The risk of stormwater floods increases when rainstorms and built-up, often impervious, land increase. Cities and, in particular, densely built city centre areas are the most significant risk zones. The financial costs of a major stormwater flood can be high. Sea, inland water system and stormwater flood risks have been taken into account with e.g. minimum building heights, land use planning and by implementing other risk mitigation measures, such as nature-based solutions.

Extreme weather phenomena, especially more frequent freezing and thawing cycles, will probably cause increasing negative and cost effects on the Finnish transport infrastructure. Less ground frost and increase in groundwater levels due to increase in rainfall will impair the load-bearing capacity of the lower-category road network in particular.

Frost heave of roads in the spring will increase due to milder winters and higher rainfall. Climate change will have effects on transport systems, the development outlook of traffic, railway structures, maintenance and need for adaptation.

With climate change, the risk of damage to roads will increase, the risk of floods on transport routes will increase and the risks caused by higher groundwater level and impacts of climate change in general will increase.

National health risks of climate change include the health hazards caused by hot summer weather already now, water-related epidemics, vector-borne infectious diseases, slipping accidents and health hazards caused by water damage. New spectrums of disease can enter Finland as a result of immigration and travelling.

The spillover effects can concern security of supply, different sectors of industry and increase the likelihood of large-scale immigration. The sectors of industry and businesses mostly exposed to the spillover effects are those with nodes in the value chain exposed significantly to the effects of climate change, such as changing extreme weather phenomena, outside the borders of Finland.

The global overall economic impacts of climate change are estimated to be negative in the long term: GDP is estimated to decrease by 10% at the most. However, the estimates of the impacts involve a lot of uncertainties, and the impacts depend on the period and the estimates of increase in temperature. The impacts can also be higher than this.

The effects of climate change will probably also be reflected in the Finnish economy, especially via international effects. One way of the impacts being reflected is through the international financial market.

In fact, a major question faced by the financial sector is the extent of risk caused by climate change on investment portfolios and when it will materialise. Climate change mitigation policy and physical impacts will be felt directly in different sectors of economy, which will be reflected in the asset categories, such as oil reserves or real estate.

Finland's National Climate Change Adaptation Plan 2022 is part of the climate policy planning system pursuant to the Climate Act. The Government approves the national adaptation plan at least once every ten years. The adaptation plan includes risk and vulnerability planning as well as necessary branch-specific action programmes for adaptation. The objective of the National Climate Change Adaptation Plan is for the society to be capable of adapting to changes in climate and controlling the related risks. The management of weather and climate risks is covered in the sub-national risk assessments, as the risks and conditions vary between different parts of Finland.

4 Threat scenarios and disruptions relating to the security of the society

Changes in the operating environment also have diverse effects on the internal development of Finland. The security of the society faces new uncertainties due to them. The threats to the society are dynamic, cross-border and varying. In this risk assessment, threat scenario refers to a description of potential disruptions in the security environment.

A disruption means a threat or event that compromises vital functions or strategic tasks of the society and the management of which requires more extensive or close collaboration and communication between the authorities and other actors.

Identifying threats and assessing their impact has turned out to be challenging. Monitoring and analysing changes in the operating environment and maintaining advance preparedness must in fact be a continuous and active effort of all parties responsible for the society's preparedness and management of disruptions.

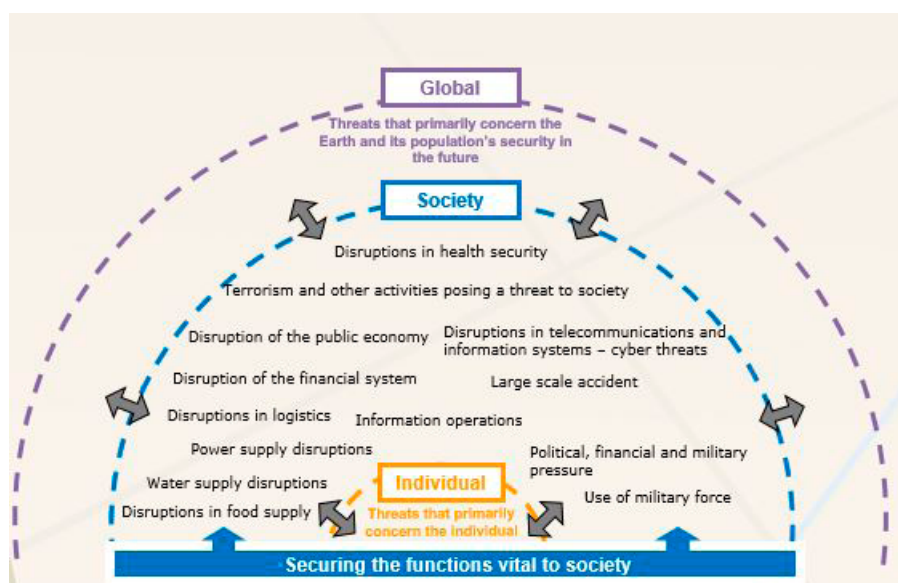


Figure 2. Threat scenarios 2018

The threat scenarios and disruptions drafted verbally describe the underlying threat or threats, target of the threat, method of materialisation and concatenation and recurrence of disruptions.

With regard to the threat scenarios and disruptions, the change trend of their likelihood was assessed. The change can be due to e.g. more general changes in the operating environment or technological development. An estimate of the trend of likelihood was marked in the table as follows:

INCREASES ↑, **DECREASES** ↓, **REMAINS UNCHANGED** —

The impact assessment was made by assessing whether each threat scenario and disruption has a **DIRECT** or **INDIRECT** impact on the vital function concerned. In addition, the magnitude of the impact on said vital function was assessed as follows:

*** MINOR IMPACT, ** OTHER NEGATIVE IMPACT,**

***** PREVENTING OR SEVERELY COMPROMISING IMPACT**

Example of the assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
	↑	**	**	*	***	*	***	**

4.1 Information operations

Information operations have become more common largely as a result of the transformation and speed of communication, emergence of social media and diversification of information channels. In the new global communication environment, it is possible to reach out to larger masses of people than ever in real time and influence the public opinion. Another reason for information operations having become more common is the fact that there are states that exploit new technological means and carry out systematic information operations with the aim of weakening the target.

Information operations are action in which the perceptions or action of the target is changed through the information and opinion environment by producing or editing information or restricting its availability.

Influencing aims to systematically stir the public debate and fade out the boundary between truth and lie. Influencing can also be systematic action carried out by a state. Its aim is to weaken the operating capacity of the society and trust in the authorities and government.

Propaganda of all kinds has always been used in conflicts in particular; in war, there are no similar rules or restrictions as during peacetime. Information warfare is influencing propaganda of the warring parties supporting their military objectives. In Finland, however, the term used is information operations, which is a more extensive concept that also covers influencing efforts during normal conditions.

What does influencing aim at?

The unity and identity of the nation are largely based on a commonly recognised history and the story about who we are. If we do not tell our story ourselves, an outsider can dictate it. The aim can be to destroy the national story of the sovereign state, thereby questioning the very right of existence of the nation.

The aim is for the target of influencing to make decisions harmful to itself or act in violation of its own interests. Creating dissent increases citizens' mistrust towards the powers that be and decision-makers. Influencing elections is a typical example.

The election results can be manipulated by way of illegal cyber attacks, or rumours concerning the trustworthiness of the election can be spread on social media. Questioning the integrity of the election can threaten the trustworthiness of entire Western democracy.

Emotion-based perceptions emerge quickly. That is why information operations aim to appeal to people's emotions and want to spread its own view of the world, with truth placed second. Rectifying the false information in public does not necessarily correct the previously disseminated false information and damage caused.

Targets and means of influencing

Information operations can be direct or subtle. Typical methods include half-truths, exaggeration, outright lying, pressuring, circulating fake news, fake web sites etc. In addition, information that is correct as such can be used in a partisan way.

The free media is a key target of influencing, as it spreads the information on extensively. Efforts are made to keep the discussion in media under control with guided strategic narratives and multi-channel communication. The media is also influenced by pressuring and threatening journalists and disseminating false information about them.

Misleading can take place with manipulated images or videos, for example, which do not have anything to actually do with the alleged matter. The material is distributed through “news sites” founded as platforms for distorted information and fake news. Made-up social media identities and “bots”, or robot accounts, distribute the information further on social media.

Influencing through information takes place everywhere across the world, and Finland is no exception. The influencing typically targets the media, citizens and political decision-makers, people of a certain nationality as well as persons living in other countries who have e.g. ties to Finland or follow what is happening in Finland.

Information operations are carried out by both state and non-state actors. Some distribute misleading information using their own name or using “fake identities”.

The first visible cases were seen in Finland approximately eight years ago, when claims that spread to the public suggested that Finnish authorities took children of Russian origin in particular into custody without grounds.

The statements of our leading politicians have been distorted, journalists and scholars have been threatened and pressured. In addition, unjustified claims questioning Finland’s history have been made.

In addition to influencing originating from outside the country’s borders, the activity can also be of Finnish origin. For example, trust in the police or other authorities can be doubted systematically on social media. Information operations can aim to hinder or complicate the operations of the authorities by influencing legislation.

How to respond to influencing?

It is necessary to be continuously prepared for information operations. Hate speech and disinformation threaten to erode the national value base and trust in the society.

The most effective ways to combat information operations are a strong national story based on the truth, a high level of education and media criticality as well as efforts to straighten lies systematically. Strong structures of society make it more difficult to spread lies.

The means also include safeguarding decision-makers and their close ones from pressuring, threatening and physical threats through training and enhanced physical security, among other means.

Trustworthy and independent media is important to citizens' free access to information. In addition, media services and the availability of Finnish content play an important role in the stability of the society as a whole and functioning of the democratic system. The role of trustworthy domestic media content is emphasised in all disruptions and even more clearly as information operations increase. For media companies, the fierce transformation of the communications field and weakening financial support has been a tremendous challenge in a time where the importance of source critique has increased. Diverse media must be supported so that media committed to good journalistic practice can expose fake news on behalf of the citizens. Dialogue between the media and citizens increases bilateral trust in the truthfulness of communication. Safeguarding the sufficient operational preconditions of Yleisradio, the Finnish broadcasting company, also plays a key role.

In a time of web-based services, increasing investment in citizens' media literacy is required. Critical use of social media is important to identify fake accounts, for example. Media literacy prevents social confrontation and dissemination and spreading of black-and-white views. Teachers and the entire educational system have an important role so that citizens have the skills and resources for identifying and assessing the trustworthiness and relevance of information.

The challenge faced by the authorities is that influencing efforts are often detected relatively late. Faster identification of fake news and an increasing information flow require sufficient resources and 24-hour monitoring. Technology may help in screening information, but the right situation picture and measures always require careful deliberation by the authorities. Acting in such situations should be trained, which also promotes the emergence of swift collaboration between the authorities.

In a Western democracy, it is very difficult to intervene in the spreading of false information through legislation. Freedom of speech guarantees everyone's right to voice their own opinion. In election-related influencing, for example, supporting certain candidates or parties through fabricated social media accounts is not criminalised.

International and in particular EU-wide collaboration is important in preventing both information operations and hybrid influencing more extensively. International co-operation facilitates comparing information operations in comparable countries; what kind of influencing different countries have experienced, and sharing best practices to combat influencing.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Information operations	↑	**	**	**	**	**	**	***

4.2 Political, financial and military pressure

Underlying threat or threats

Political, financial and military pressure (hereinafter referred to as “pressure”) aims to influence the decision-making and operations of a state to achieve objectives which the targeted state would not otherwise consent to. Pressure can also promote on-going matters and events in the target state beneficial to the instigator. The purpose of pressure is to question the operating capacity and legitimacy of the political leadership of the targeted state and cause general uncertainty and weaken the population’s will to defend the country.

Pressure can also be exerted on media and in international politics and forums. Pressure can be comprised of individual measures, it can increase gradually, or it can take place at several levels at the same time. Information operations, disturbing information networks and denial-of-service attacks are examples of forms of pressure. The instigator of the pressure can be difficult to identify.

Target of the threat

The targets of pressure are political decision-making as a whole and vital functions; pressure influences the state’s leadership, civil peace and public opinion. Pressure can involve disturbing, preventing or interfering in the actions of the authorities, functioning of business, services or payment traffic and border violations or concentration of troops in the vicinity of borders. Hybrid influencing, which combines military and non-military means, including cyber influencing, use of special forces, political assassinations and staged accidents, are part of the means available in pressure.

Finland will likely be part of a larger group of countries targeted by pressure (such as EU member states or NATO member or partner countries). Pressure can also aim to isolate Finland from a larger group of countries or partners.

Method of implementation (possible)

The means of pressure and use of military force are not clearly separated; on the other hand, the boundary between state and non-state action is increasingly difficult to identify. Regional crises which have also involved the use of military force in recent years have emerged through a surprising and fast development of the situation.

According to the possible threat scenario, instability is caused in the targeted area with the means of information operations, also utilising social media. The media may be fed with distorted information that distorts the situation picture and makes decision-making more difficult for its own part. Cyber operations are also prepared in advance by e.g. hacking information systems.

In crises, Finland can be subjected to economic and political countermeasures by e.g. parties hostile to the European Union, or possibly unexpected offers of co-operation. The position of groups of people living in Finland is reviewed critically and diverse grievances are highlighted and their correction demanded. Any actions by the authorities addressing foreigners living or arriving in Finland as well conflicts with the majority are given a lot of media coverage.

The means used for pressure combine military and non-military operations, covert operations, information operations and cyber influencing, instigating internal conflicts within the population and causing imbalance in the society. The means are used and varied flexibly as warranted by the situation.

Pressure can be followed by the use of military force, if the pressure does not achieve the desired objectives. The use of military force will probably begin with the aim of a surprise momentum and to a limited extent.

Concatenation and recurrence of faults and disruptions

In pressure situations, the impacts on people and the environment will remain low, but they can become severe from the point of view of the functions of the society and the will to defend the country. The indirect economic impact of pressure that involves considerable restriction or interference of import and export are significant. Pressure affects all vital functions in different ways.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Political, financial and military pressure	↑	***	**	**	**	***	**	***

4.3 Use of military force

Underlying threat or threats

The primary objective of sustaining Finland's defence capability is to create a preventive deterrent to the use and threatened use of military force and capability to safeguard territorial immunity and repel attacks. Prevention requires the capability to increase the defence readiness preventatively and military performance capabilities matching the threats. Security threats are prevented and prepared for in accordance with the principles of comprehensive security.

Use of military force against Finland may be the result of a military conflict in Finland's neighbouring regions or reflection from a more extensive international crisis outside the neighbouring region. An extensive international conflict can have spillover effects in the Baltic Sea region, with Finland becoming a target of use of force in a situation in which Finland is not an actual party to the conflict. In a conflict emerging in the Baltic Sea region, it is not realistic to assume that Finland would stay outside the conflict.

One possibility is a situation in which an attack against an EU country brings up the question of the obligation of Finland (and other EU countries) to provide assistance in accordance with the Solidarity Clause of the Treaty of Lisbon, if requested.

Intelligence capability, readiness to act in rapidly evolving situations, ability to protect against the effects of long-range weapons systems and cyber defence capability are emphasised in the changing operating environment.

Target of the threat

Military force is used to weaken Finland's international position, operational prerequisites of military national defence, hinder the maintenance of vital functions and the operating capacity of the economy and infrastructure. Large-scale use of force aims to paralyse Finland's defence capability and prevent the independent decision-making ability of the state leadership.

In addition to national defence, the targets of use of force include disrupting vital functions, such as information networks, power and energy distribution networks, information resources, traffic nodes, communications systems, logistics and all connections abroad.

Being subjected to military force requires allocating a significant proportion of the society's resources to supporting military defence. Maintaining vital functions becomes more difficult, and significant strain is placed on employment and the economy.

Method of implementation (possible)

Use of military force against Finland is part of the diverse means of influencing, causing disruption with a combination of indirect and direct means and aiming to paralyse vital functions. The intensity of the use of military force may vary from a low-intensity crisis to extensive use of military force. The targets of the use of force also vary in different phases.

The implementation probably begins with pressure using different means. If the pressure does not reach the desired outcome, either limited or large-scale military operations can be commenced. The adversary may aim to prevent the use of a nearby area by a third party or to form a military buffer zone to protect its strategic targets. Operations are supported through information operations. The effect of the use of military force or threatening with it is based on the adversary's ability to create force rapidly and unexpectedly. The focal point is on intelligence, use of special forces, air force and long-range fire and marine operations.

The adversary implements limited operations swiftly and seeking an element of surprise. A limited operation can involve weapons systems or special forces striking military and strategic targets, takeover of areas, preventing the use of marine area and preventing the free use of air space. A limited operation is maintained only during the time required for reaching the strategic objectives and using adequate resources. A limited operation involves preparing for continuing the use of force through larger-scale operations.

Concatenation and recurrence of faults and disruptions

Being subjected to military force weakens the state's decision-making ability and compromises civil peace. Cyber attacks are a threat to national security, and they can be comparable to an armed attack in terms of effect and severity. Even small-scale use of military force or takeover of a limited area – tying Finland to the conflict – can make Finland's foreign political position significantly more difficult and decrease political leeway.

In the scenario of use of military force, use of a nuclear weapon or merely threatening to use on in Finland's neighbouring area has effects on the society even in a scenario in which the radiation hazard does not ultimately become severe or only part of the fallout lands in Finland. A nuclear weapon will cause a considerably risk to the nearby area also in a possible accident.

Probably, some protective measure will be necessary in at least part of the country in that case, and the disruption caused to the society can be significant. The need for radiation measurements of goods and people at the borders will be high. People's need for mental support will also impose a challenge on the authorities. Depending on the affected area, Finland's international connections may be partially or completely severed temporarily. The use of a nuclear weapon far away from Finland would mainly have diverse spillover effects on Finland.

In addition to the extent of the adversary's actions, the impacts of the scenario of use of military force depend on Finland's own countermeasures and the society's resilience. The impacts on the society can become very severe.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Use of military force	—	***	***	**	***	***	***	***

4.4 Terrorism and other activities posing a threat to society

4.4.1 Large-scale immigration

Underlying threat or threats

In large-scale immigration, refugee reception centres and their additional beds are about to become full or are overcrowded, the influx of immigrants is continuous and there are more incoming than leaving immigrants. Immigration is large-scale when people arriving in the country can no longer be forwarded to the scope of measures taken by the authorities through border control arrangements or investigating the preconditions for entry or registration of immigrants is not possible through normal arrangements. Activities will, however, resume in accordance with the legislation applied under normal conditions. Finland may also become a pass-through country, with the immigrants aiming to reach the neighbouring countries.

International politics and globalisation have effects on the causes, extent and direction of migration. The development of the world economy and uneven distribution of wealth and other resources intensify migration while labour-related mobility and demand and supply of labour promote the immigration of labour. A welfare society is a factor attracting migrants and refugees.

International migration is caused by wars and conflicts, environmental and climate change and the hope for better living standards. Asylum seekers fear that they will be persecuted due to their ethnic origin, creed, nationality, membership in a specific religious group or political opinion in their home country or country of residence. Possible technological disasters and accidents can also cause major migration.

There are currently approximately 70 million people displaced due to the threat of war or violence in the world. Some 25 million of them have been forced to leave their home country. In addition, it has been estimated that there are 200 million refugees because of environmental and climate change.

The number of displaced people is estimated to increase further. The magnitude of migration is affected by changing situations in the countries concerned and opportunities for travel.

Target of the threat

The society's psychological resilience to crisis is the primary target of the threat in Finland. The key factor strengthening resilience is the citizen's faith in the authorities being in

control of the situation. Should this fail, it would have significant political effects, and it can compromise public order and security. In the scenario of large-scale immigration, the biggest threat from the humanitarian perspective affects the immigrants in their home countries and along their travel route, and to some extent in Finland as well.

The second-most significant target of the threat in Finland is the impact of large-scale immigration on the public-sector economy. In the long term, the pressure is particularly on the funding balance of the social security benefit system in case of failure in the integration of those granted asylum. In the shorter term, several other authorities, the education system and the judicial system each incur additional costs amounting to tens of millions of euros per year. The economic strain caused by large-scale immigration will continue for several years after the emergence of the disruption, even though to a lesser extent year by year as the asylum decision-making progresses.

Immigration may be associated with political pressure towards Finland. In this case, it is possible that criminals, scouts and even special forces are infiltrated to Finland among the immigrants. The targets of these actors are critical to vital functions, including key personnel. Large-scale immigration can also be used as a means of exerting pressure by itself.

Method of implementation (possible)

The threat scenario assumes that the reason for entry can be an acute situation caused by mass exodus, but in practice, immigration can take place in phases, occur as a regional or local disruption in immigration in the early phase and gradually expand to the national level. The critical threshold of large-scale immigration could be considered as a situation in which refugee reception centres and their additional beds are about to become full and the established temporary accommodation units are about to become full or are overcrowded, the influx of immigrants is continuous and there are exceptionally far more incoming than leaving immigrants.

In the scenario of large-scale immigration, overland routes facilitate the biggest volumes; with regard to internal borders, mainly the land border with Sweden, and with regard to external borders, the eastern border (border crossings and/or land border). The mobility can be influenced by the authorities of the country of origin or pass-through country wanting and acting to guide immigrants in their own area.

Concatenation and recurrence of faults and disruptions

The scenario of large-scale immigration involves the risk of not being able to organise the control, registration and reception of immigrants in a controlled manner and carrying out

the residence permit procedure quickly. The risk concerns the early phase of the situation in particular. Economic risk is increased if the authorities do not succeed in organising the transition to municipalities and integration measures smoothly after the permit decision, or expulsion of those who have been given negative decisions.

Those who have received a negative decision staying at reception centres, waiting for the Administrative Court's decision on their appeal or expulsion, will increase the likelihood of disruptions both inside the centres and in the neighbouring areas. If repatriations cannot be realised, the risk of a strong increase in illegal residents will emerge.

Actions by the authorities and signals of the situation not being under control may give rise to distrust in the authorities. It will weaken the citizens' sense of security and increase instability in the society.

As a result of large-scale immigration, strong sentiments towards immigrants may emerge in the original population. The opinions of the extremes stand out markedly, and neutral communication by the authorities and other actors will be important. The authorities must provide citizens with reliable and neutral information about the phenomenon. Crisis communications and interaction between the authorities, non-governmental organisations and residents can promote correct and trustworthy information reaching the audience.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Large-scale immigration	↑	**	**	*	***	*	***	**

4.4.2 Terrorist act targeting the structures of the society or large crowds

Underlying threat or threats

There are diverse reasons behind violent radicalisation, and there is no single profile with which persons who might be planning a terrorist crime or large-scale violence could be easily and certainly identified.

According to the estimate of the Finnish Security Intelligence Service, the threat of terrorism in Finland still comes from individual actors or small groups, motivated by radical Islamist propaganda or prompts of terrorist organisations.

These persons are likely to have direct or indirect connections to radical Islamist networks or organisations. The Finnish Security Intelligence Service has become aware of terrorism-linked plans and projects in Finland which have been more serious than before. The number of target persons has increased, especially in recent years.

As a result of radicalisation and revealing of new networks, similar development is expected to continue. In addition to quantitative growth, the target persons' links to terrorist activity are increasingly direct and serious. An increasing share of them have either taken part in an armed conflict, expressed the will to military action or received terrorist training.

In addition, the police has identified a significant number of concern-raising persons with the ability and will to carry out attacks on large crowds or structures of the society.

Target of the threat

An act of terrorism can target the leadership of the society, critical infrastructure, public places or large crowds. An attack can cause limited or significant immediate and also long-term effects. It can also have impacts beyond the actual act. It can increase fear among the population and the need for security measures. Security measures, on the other hand, may have effects on the citizens' day-to-day lives.

Method of implementation (possible)

The majority of acts of terrorism carried out have recently made use of easily realised low-cost methods, such as vehicles and edged weapons. Attacks carried out using simple methods are quickly realised and do not require special expertise or long preparations or planning, unlike attacks using explosives or firearms.

However, the threat of conventional attacks with explosives or firearms has not gone away. They can involve the use of CBRNE materials. The use of unmanned aerial vehicles cannot be excluded due to their ease of use and low cost.

A radiation hazard emerges if a radiation source is set off using conventional explosives. The severity of the radiation hazard depends on the type and intensity of the radiation source as well as the power of the explosive. If an explosive is used in causing the incident, the site of the explosion and the surroundings up to 300–400 metres away are

contaminated. In addition, there can also be very small, highly radiating fragments in the same area, causing skin radiation damage that is difficult to treat when handled for a few minutes.

A similar radiation hazard can also be caused by intentionally spreading powder or liquid radioactive material in the living environment. The situation might not be necessarily noticed very quickly.

In this case, the people in the contaminated area and handling the contaminated objects might even be exposed so much that the situation causes health effects. The situation would have significant effects on people's living conditions and environment.

Concatenation and recurrence of faults and disruptions

An attack on key vital functions, such as an act targeting information network and power grid nodes, can cause significant secondary damage on the functions of the society.

Especially an act of terrorism on the sea (passenger or cargo vessel) would be very likely to involve a sea rescue mission and/or environmental disaster management.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Terrorist act targeting the structures of the society or large crowds	—	**	*	**	***	*	*	***

4.4.3 Violent, large-scale civil disturbances

Underlying threat or threats

Different European countries have experienced violent, large-scale civil disturbances, which can go on for days. Also people and groups whose aim is to turn the situation into a violent riot take part in such disturbances.

Large-scale and prolonged violent unrest taking place in several places or in different towns and cities at the same time may result in a situation that the police do not have sufficient resources to keep under control.

The factors that increase the risk of disturbances include the types of social problems and experiences of inequality that affect people's everyday life, disturbance or complete interruption of the functions of the society due to e.g. failure in power supply or the cyber environment, increasing social exclusion, actions of extremist movements, the effect of the social media and the increasingly tense international situation.

Target of the threat

Disturbances can degrade the security and sense of security of citizens and cause financial damage. The unrest can also affect the functions of the society, decrease trust in political decision-making and the authorities' action.

Method of implementation

People's dissatisfaction and release of tensions can be agitated consciously and systematically. Action on social media, hate speech and fake news feed the sense of dissatisfaction among people and may lower the threshold of taking part in violent disturbances. Also peaceful demonstrations can be attended by those agitating violence and unrest on purpose, aiming to turn the event into a violent riot.

Concatenation and recurrence of faults and disruptions

Unrest has effects on the functions of the society, and should they expand, on the possibilities of the police to maintain public order and security. If the situation escalates and prolongs, the possibilities of other authorities to provide official assistance may be impaired as their resources are tied to taking care of their own duties.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Violent, large-scale civil disturbances	—	**	*	**	***	*	**	***

4.5 Disruption of the public economy

Underlying threat or threats

The availability of funding for the public sector is a precondition for safeguarding vital functions of the society. Public-sector expenditure is funded primarily through taxes, social security contributions and property income. The deficit between expenditure and income is covered through lending in the international money market.

Target of the threat

At worst, a disruption of the public economy threatens the state's funding ability. Loss of funding ability may be the result of the state losing its creditworthiness or prevention from using the infrastructure required for obtaining funding.

Method of implementation

The financial risks of the public economy are associated with unforeseen macroeconomic development and the materialisation of diverse contingent liabilities. A negative disruption of macroeconomy may lead to an economic recession and further to an increase in the state's indebtedness and decrease in financial assets through lower asset values. A soft economic situation can cause the state's indirect liabilities to be triggered, thereby further straining the already weakened public economy and national economy on the whole.

The materialisation of direct, indirect and hidden liabilities depends on economic development. Finland's economic outlook is expected to be favourable in the next few years. However, the development involves risks. With the increase in indebtedness and indirect liabilities, the state's freedom of action and ability to face negative shocks has weakened in recent years.

A severe disruption of economic development can be connected to a culmination of political tension and juxtaposition in addition to various economic phenomena. All crises leading to reduced economic activity should they prolong may lead to compromising the availability of funding for the public economy.

Should they materialise, almost all threat scenarios described in this National Risk Assessment would have a negative impact on the public economy as well. The financial position of the public economy and the state economy in particular is at risk of being weakened as the preconditions for economic activity are disturbed typically in crises. At worst, tax income may reduce strongly while there is significant increasing pressure on public expenditure as unemployment increases, for example. In addition, reacting

to disruptions compromising the society's functioning usually increases needs for expenditure when aiming to prevent and mitigate the consequences of the crisis. Disruptions of the financial market in particular have typically had strong spillover effects on the public economy as well.

Concatenation and recurrence of faults and disruptions

Safeguarding the state's liquidity and creditworthiness in severe disruptions of the public economy requires exceptional measures relating to financial and monetary policy. The required short-term measures include preparing for prioritising critical payments, for example. In the longer term, it is necessary to make significant spending cuts and increase diverse taxes and levies. These measures may have negative secondary effects on the national economy, livelihood of the population and various public services.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Disruption of the public economy	—	*	**	**	**	**	**	***

4.6 Disruption of the financial system

Underlying threat or threats

Stable and disruption-free operation of the financial market is a precondition for the functioning of the society. Disruptions of the financial market compromise the availability of funding that is absolutely necessary for both private and public organisations and also individual people.

Financial market crises can, if not controlled, become economic crisis threatening the entire national economy. They can also lead to a collapse of the creditworthiness of businesses and the state, thereby destabilising the entire society.

Disruptions of the infrastructure of the financial market and prevention of the use of critical systems can compromise the continuity of vital functions. Functioning of the economy and infrastructure, securing the population's minimum subsistence and carrying

out security-related duties require the availability and permanence of asset-related information and the ability to make, transmit and receive payments.

Target of the threat

From the point of view of the financial market, threat scenarios have conventionally been divided into the materialisation of financial market risks on the one hand and on severe disruptions of the infrastructure used for providing financial services on the other. The first category includes the realisation of financial risks relating to the financial market, such as liquidity, market and credit risks. The second category, severe disruptions of the infrastructure required for providing financial services, is part of operational risks. Examples of these include severe disruptions of information systems and data traffic and severe issues relating to energy supply.

The distinction between these risks is, however, becoming more vague. Providing financial services has, for the key part, become a digital business. The real-time nature of operations emphasises the importance of the continuous fault-free functioning of information systems. The materialisation of operational risks may lead to such significant financial losses or loss of trust in the market as to compromise the financial continuity of operations.

Method of implementation

From the point of view of the financial market, the threat scenarios can be realised in two ways: either “from outside” the financial market so that they have a negative effect on the financial market, or so that the financial market itself causes a disruption that spreads elsewhere to the economy and society.

International crises of the financial market are a key trend threatening the functioning of the financial system. Excessive risk-taking combined with poor resilience underlies financial market crises.

This means that even an unforeseen individual event can trigger a crisis. The impacts of such a crisis can concern Finland either directly or indirectly.

The development of the world economy involves several uncertainties that can also contribute to triggering disruptions of the financial market. Geopolitical confrontations, disturbances in international trade or political instability can also cause disruptions in the financial market. The exceptional monetary policy that has been continuing for a long time supports growth, but also exposes the financial market to disruptions. The stability of the euro area is still subject to uncertainties as the result of the decade’s economic and

debt crisis, and their culmination due to political developments, for example, cannot be excluded.

With the digitalisation of the financial sector, also operational systematic risks, cyber risks in particular, have emerged. The operating capacity of an individual actor in the financial sector can be compromised due to the materialisation of a cyber risk in addition to business-related reasons. Such as disruption can then spread to other parts of the financial system and compromise market activities on the whole.

The functioning of the financial market is very bank-driven in Finland. The Finnish banking sector in itself is very centralised and large compared to the GDP. The structural characteristics of the financial system weaken its resilience and strengthen the passing of disruptions between parties. As a result of the structural changes in the banking sector, Finland is still tied to the other Nordic countries and at the same time to disruptions of the world economy as well. Increasing indebtedness of households weakens the ability of households and, at the same time, also the entire national economy to adjust to negative surprises in the economy. High indebtedness may also intensify the effects of economic disruptions.

Should they materialise, almost all of the threat scenarios described in this National Risk Assessment would cause some degree of shock in the financial market as well. In addition, the materialisation of many of the threat scenarios could lead to the inability to use the infrastructure required in providing financial market services. The functioning of the financial market as such can also be chosen as the target of hostile influencing. The information systems and information resources required for providing financial market services are located abroad in key respects. Prevention of the use of these systems can interrupt payment traffic, card payments and securities trading in Finland as well.

Concatenation and recurrence of faults and disruptions

Very strong interdependence is characteristic of the functioning of the financial market, exposing to rapid spreading of disruptions. A strong negative impact on the rest of the national economy is typical of disruptions in the financial market. Disruptions of the infrastructure of the financial market and prevention of the use of critical systems can compromise the continuity of vital functions.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Disruption of the financial system	—	*	**	**	**	***	**	***

4.7 Power supply disruptions

4.7.1 Major disruption in power supply

Underlying threat or threats

Power supply may be interrupted due to a variety of reasons. Extensive and long-term regional interruptions in power supply in Finland have been caused exclusively by trees fallen on power lines due to storms and packed snow in recent years. Other possible threats include extensive technical or man-made disruptions in power generation, transmission or distribution.

There may also be disruptions in the availability of fuels or power import connections. The sector can be subjected to cyber attacks or disruptions in labour availability due to industrial action or a pandemic, for example.

Energy infrastructure can deteriorate due to the impact of unforeseen energy and climate policy, for example. A threat to power generation also lies in the closing down of unprofitable power plants, which particularly concerns condensing power station operating on market terms. The availability of power via international links can also be exposed to influencing due to political reasons, both in disruptions and normal conditions.

Rare strong space weather storms constitute a separate threat; their impacts on vital functions can be long-term and very significant.

The progress of climate change can increase the risk of major disruptions in power supply, especially due to the reduction of ground frost, and increase the exposure of trees to wind damage and packing of snow. Freezing rains are also likely to become more common.

They increase the exposure of the power distribution infrastructure to damage. Warmer summers and long spells of hot weather becoming more common due to climate change may also have effects on the functioning of nuclear power plants. A very high sea water temperature decreases the cooling power of nuclear power plants. In order to ensure cooling, the power plant has to reduce the power of the reactors or close them down.

Target of the threat

Uninterrupted availability of power is particularly critical to security of supply. A severe disruption in power supply has effects on all of the functions of the society and can compromise vital functions and the wellbeing of the population. During a cold spell, the importance of power becomes even more emphasised as the need for heating increases. Besides electric heating, the majority of other methods of heating require electric power to operate. The situation is alleviated by fireplaces built in several residential buildings as well as other alternative heat sources.

Space weather storms have minor direct impacts on people and the environment, but indirect impacts can arise from e.g. interruptions in power supply and problems with data traffic. The economic and other impacts will be multiplied if the disruption persists.

Method of implementation (possible)

A disruption in the availability of electric energy due to insufficient power generation or import is not easy to rectify in all cases. If there is no adequate backup production capacity or possibilities of importing electric power, the only way to react to the situation is to limit the overall consumption of electricity, possibly using circulated power interruptions. During the winter peak consumption, approximately one-fourth of the need for power is covered through imports. If it turns into a shortage of power, the situation can lead to curtailments of power use.

With regard to the national grid, two simultaneous major disruptions during peak consumption is a major risk. Simultaneous failure of a major nuclear power plant and import connection could be an example of such a situation.

In this case, the worst case scenario is that the joint use of the entire power system collapses, thereby making the entire national grid fall down. It can take days to get the grid up and running again.

In the worst case scenario concerning power supply, a strong storm would pass over Finland so that there would be extensive areas without power in the area of several grid companies at the same time. At worst, correcting the faults and returning the power

supply can take several days, even weeks. The situation would be made worse by it taking place in the winter, when electricity is used much for heating as well.

During strong space weather storms, geomagnetically induced power currents would cause voltage fluctuations in the power supply national grid, and possibly transformer damage. Finland's national grid is relatively resilient against changes in space weather, but problems in the neighbouring countries can also be reflected in Finland via the joint Nordic power grid and our need for importing electric power.

Concatenation and recurrence of faults and disruptions

The society is very dependent on electric power. Even short (even under 10 seconds) disruptions in power supply may cause problems to some industrial processes. If the interruption in power supply is prolonged, most functions of the society are greatly disrupted or cease to function altogether in practice.

Disruption or complete cessation of functions due to disruptions in power supply would compromise all vital functions of the society.

Interruption of power supply due to a space weather storm could last for the duration of the storm, a few days at the most. For some older transformer types, the ultimate risk is permanent damage to the transformers, which would considerably slow down the recovery of the functioning of the power grid, but this is not considered probable in Finland.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Major disruption in power supply	—	**	*	*	**	***	***	**

4.7.2 Severe disruption in the availability of fuels

Underlying threat or threats

Procurement of oil, coal, gas and nuclear fuel depends entirely on imports. Energy policy aims to reduce the dependence on imports, but a significant share of the procurement of fuels will be based on imports also during the next few decades.

The availability of fuels has a major effect on e.g. primary production, food and fuel supply transports, public transportation and logistics in general. Fuel supply can deteriorate due to the impact of shortsighted energy and climate policy, for example.

The use of domestic fuels is based on an extensive logistics chain. With regard to biomass, for example, the chain includes harvesting, storage (drying), transport and chipping. Disruptions in any part of this chain cause the entire delivery to be interrupted, thereby disrupting energy production.

New and alternative sources of energy becoming more common sets major challenges also for the system based on conventional stockpiling and regulation mechanism. Stockpiling capacity for the new energy sources might be non-existent, and stockpiling them can be difficult.

The reliability of distribution also has significant impacts on the availability of fuels to the end users. Distribution being exposed to disruptions may be an even bigger risk than the risk of running out of the actual fuel.

Target of the threat

The risk for oil and coal is the prevention of maritime transport and pipe transport of natural gas. A disruption in the supply of imported fuels lasting several months will begin to significantly hamper the generation of heat and electricity. The risk facing the availability of domestic fuels is challenges in logistics and in particular stockpiling.

Method of implementation (possible)

Prolonged prevention of maritime transport to Finnish ports is possible during exceptionally harsh winters. An exceptionally harsh winter would impose increasing requirement for the adequacy of ice-breaking fleet, as vessels meeting new environmental regulations have poorer ice performance.

Long-term economic or labour market disruptions affecting Finnish shipping or ports would also have significant impacts on Finnish shipping. More limited impacts on Finnish

shipping or the functioning of ports could be caused by individual threats relating to international crime or terrorism, data traffic or cyber security problems affecting the logistics system or major accidents associated with shipping or ports.

The majority of Finland's internal logistics is based on road transport; without fuel distribution and related fuel deliveries, logistics transports will practically cease until traffic fuels are available again.

The availability of fuels is particularly emphasised with regard to the availability of Finnish fuels. The production of domestic fuels is very decentralised, and its logistics is comprised of very many parts. This cannot, however, be considered to be a major security risk, as coal, peat or wood exist as alternatives for domestic fuels. A ban on the use of black coal for energy has been planned to enter into force in 2029. The ban would take out one option from plants firing solid fuel.

A threat scenario associated with natural gas is that deliveries from Russia to Finland will be suspended for several months. A liquefied natural gas (LNG) import terminal network is being built in Finland, which will improve the situation for its own part. A natural gas transfer pipeline between Finland and Estonia will probably be completed in 2019. The security of supply of natural gas is currently based on the use of substitute fuels in Finland. The model will not be abandoned even after the alternative import routes are complete. In addition, alternative import routes increase the security of supply of natural gas.

Concatenation and recurrence of faults and disruptions

Disruptions in fuel deliveries can be reflected in power and heat production, business, transports and housing. Extensive disruptions can have significant secondary effects. Problems with the availability of traffic fuels would also affect the deliveries of Finnish fuels.

Distribution of fuels being exposed to disruptions may be an even bigger risk than the risk of running out of the actual fuel.

Even now, it is not possible to distribute fuel adequately from the distribution points if the stations have no power and data connections required for payment traffic. Energy supply will not be a straightforward purchase transaction in future, either, but a service event requiring more extensive information systems. These information systems are decentralised and their production can be located abroad or in cloud services.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Disruption in the availability of fuels	—	*	*	**	**	***	**	**

4.8 Disruptions in telecommunications and information systems – cyber threats

4.8.1 Severe disruptions in communications networks and services

Underlying threat or threats

Without functional communications services and networks, many services of trade and society are not available or their use is at least hindered significantly. Many of the citizens' day-to-day services and routines also depend on the reliable functioning of communications services and networks. From the point of view of managing the society and the psychological resilience of the population, it is important that communication between citizens, emergency calls, authorities' communication channels and mass media also function in severe disruptions and exceptional conditions. Uninterrupted functioning of radio frequencies is also a very critical function to the operation of the society.

Particularly strong space weather storms are a separate threat to the communications network and services. The most recent very strong space weather storm was the "Halloween" storm in October–November 2003. In addition to an extensive blackout in Southern Sweden, it caused several satellites to experience malfunctions, be offline for over a day and break down altogether.

Disruptions in satellite positioning and the accurate time signal provided with it interfere e.g. transport logistics and operations of the authorities.

Target of the threat

Several services vital to the society, such as payment traffic and power networks depend on the functioning of communications services and networks. For example, IT services

of businesses depend on data connections to foreign data centres. Therefore, severe, extensive or prolonged disruptions in the functioning of communications services and networks constitute a significant threat to the functioning of the society. In future, the society will increasingly depend on the reliable functioning of communications networks and services, with an increasing share of things, devices and means of transport being connected to the internet and their operation being controlled through the processing of digital data.

Communications services particularly critical to the society include emergency calls and transmission of the authorities' hazard warnings and targeted official announcements to citizens. Similarly critical communications networks include, in particular, domestic and international data connections and the mobile network.

In radio frequency disruptions, it is particularly important that there are no disruptions in the frequencies used for emergency and security traffic and the authorities' networks, mobile networks, mass media transmission connections and energy supply and civil engineering remote control networks.

Method of implementation (possible)

Hardware and software failures are particularly common causes of malfunctions in communications services and networks. Approximately 10–20% of severe incidents in the functioning of communications networks and services result from power supply disruptions. Power supply disruptions also usually last longer than other faults.

Under normal conditions, radio frequency disruptions are usually caused by a system malfunction or other technical fault. The disruptions can be caused by an unintentional technical failure or intentional influencing.

Possible other causes of disruptions in communications services and networks include data security incidents and new kinds of cyber threats, communication service delivery failures affecting a limited group of users or geographical area, extreme weather conditions, intentional disturbing of communications, international crime and terrorism, major accidents and economic and labour market disruptions.

Cyber threats and intentional interference of communications are examples of conscious and intentional action aiming to influence the functioning of communications networks and services. Such action can be taken by criminals, terrorists and state actors, among others. There may also be political reasons in the background, or in the case of individual instigators, the will to show off. Denial-of-service attacks, data burglary, disinformation edited through cyber operations, information network intelligence operations and other

interference of information networks targeting the Finnish state or society are examples of methods of implementing cyber operations.

At worst, targeting the healthcare system, energy production or industrial control systems with a cyber attack may cause material losses and loss of human lives.

In addition, a particular disruption in communications services can be associated with the name services of the fi domain. A severe technical problem in the fi root name services would stop all fi-suffix traffic on the internet. Such a situation could emerge not only as a result of a technical fault, but also due to intentional influencing.

A strong space weather storm would interfere in satellite-based data transfer, or the complete destruction of a satellite could cause significant immediate damage to the users of satellite connections. Satellite positioning would be completely out of operation for approximately 24 hours, after which there would be disruptions in it for a few days. The loss of the time signal of a positioning satellite could affect the functioning of mobile phone base stations and other synchronised systems. The HF radio connection to planes flying over oceans would be lost in extensive areas, which would lead to flights being delayed or cancelled due to safety reasons. Flight routes would also need to be altered. Solar activity could interfere with the radar systems of airports and, in the worst case, close down the air space for a few hours.

Concatenation and recurrence of faults and disruptions

Due to the interdependencies of various electronic systems and services, the concatenation and recurrence of faults and disruptions is a significant threat. A disruption in the functioning of communications networks or services affecting power generation, for example, would have extensive impacts on the society. Also, disruptions in individual network services could be a risk to the availability of services if a considerable number of other services depend on the functioning of a single service, such as authentication services. The interdependency of systems is also increased by an increasing number of devices being connected to the internet (internet of things).

A very severe, extensive or long-lasting disruption in the functioning of communications services, networks, the fi domain or radio frequencies would also deteriorate public trust in the electronic services of different sectors, for example, and also cause indirect disruptions in the maintenance or security of these electronic services in the society.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Severe disruptions in communications networks and services	↑	**	*	**	***	***	***	**

4.9 Disruptions in logistics

Underlying threat or threats

The logistics systems is comprised of transport of goods and people, transport-related interim storage, logistics centres and control and management processes and systems associated with the management of the overall systems, as well as associated cash flows. Logistics make use of the traffic system as part of its operation. The management processes and systems are electronic and based on data transfer and processing. Logistics systems are usually global, but partially also national.

Maritime transport accounts for 90% of the exports and 70% of imports in Finnish foreign trade. Maritime transport-related disruptions would therefore be immediately reflected in Finland's economy and society as well as the transport logistics system supporting their operation. From the point of view of the security of supply of Finland's economy and the functioning of the society, fuels are the most noteworthy product category. Fuel is imported to Finland by sea to a significant extent.

Target of the threat

Disruptions in the international logistics system and maritime traffic in the Baltic Sea or availability of air space in Finland's neighbouring area would also cause significant impacts on Finland's logistics system. Such significant disruptions could result from a change in international or European security political situation, prolonged extreme weather phenomena relating to shipping in the winter or natural disasters affecting aviation. Such threats would have immediate effects on Finland's economy and society, as the normal transport routes of Finland's foreign trade would not be available. In particular, the

transport volumes of Finnish shipping are so high that replacing the current sea transport routes with alternative transport routes and methods would be extremely difficult.

Long-term economic or labour market disruptions affecting Finnish shipping or ports and distribution issues with power or fuels would also have similar, but more limited impacts.

Impacts more limited than those described above would be caused by individual threats associated with international crime or terrorism and major traffic accidents. The logistics system can also be influenced via information systems through e.g. cyber attacks, data burglary, sabotage or malware, which can lead to considerable damage.

Method of implementation (possible)

The likelihood of disruptions affecting maritime traffic in the Baltic Sea or availability of Finland's nearby air space due to changes in the international or European security situation is very difficult to estimate in practice.

The most significant extensive risk associated with Finland's logistics system that can be estimated is extensive freezing of the Baltic Sea. Should it continue for long periods, it would cause significant problems to Finland's foreign trade and security of supply.

Vessels meeting new environmental regulations have poorer ice performance, which sets increasing requirements for the adequacy of the ice-breaking fleet. As a result of rapid climate warming, there will be less ice cover in the Baltic Sea, but challenging ice conditions will continue to occur. In practice, extreme weather and climate phenomena will increase, and therefore attention must be paid to exceptional conditions. There is also the risk of the ice-breaking fleet being reduced due to milder winters being common, and therefore a shortage of fleet during a winter with harsh ice conditions.

Long-term economic or labour market disruptions affecting Finnish shipping or ports would also have significant impacts on Finland's logistics system. More significant, but also more limited impacts could be caused by individual threats relating to international crime or terrorism affecting Finnish shipping or the functioning of ports, data traffic or cyber security problems affecting the logistics system and major accidents associated with shipping or ports. The above-mentioned threats can also be associated with more extensive hybrid influencing scenarios.

Restrictions to the use of Finland's or nearby air space would have direct impacts on aviation at Helsinki Airport. Significant foreseen restrictions to the use of air space can be caused as a result of an ash cloud caused by a volcano, for example. Long-term economic or labour market disruptions affecting airports or international airlines would also have

significant impacts on Finnish aviation. Significant, but more limited impacts would be caused by international crime or an act of terrorism affecting aviation or the operation of airports, data traffic and cyber security issues in flight control systems, power supply or aviation fuel distribution issues and major aviation accidents. The above-mentioned threats can also be associated with more extensive hybrid influencing scenarios.

Concatenation and recurrence of faults and disruptions

Power and fuels are basic prerequisites for the functioning of logistics; disruptions in them are multiplied and require cross-sectoral preparedness. Power supply disruptions would interfere with the distribution of traffic fuels, for example. A power failure in the national grid would have significant impacts on rail traffic.

Severe maritime shipping disruptions would cause problems in fuel supply, which, in turn, would be reflected in traffic fuel distribution and other road transports, affecting e.g. the operation of daily consumer goods trading. Disruptions in the availability of daily consumer goods impair the functional capacity of the population and services. Disruptions in the supply chain quickly have impacts on medicine supply and health and medical care. Disruptions in export transports would be quickly reflected in the economy.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Disruptions in logistics	—	*	**	**	**	***	***	**

4.10 Disruptions in health security

4.10.1 Antimicrobial drug resistance

Underlying threat or threats

Antimicrobial drug resistance refers to microbes becoming resistant to pharmaceuticals used in the treatment of infections in people and animals (antimicrobial drugs and antibiotics). Antimicrobial drug resistance is not a new phenomenon, but large-scale use of antimicrobial drugs in people and animals, rapidly increased tourism and movement of

foodstuffs and animals between countries and continents have deteriorated the problem with resistance. Currently, there are microbes resistant to all antimicrobial drugs in use in the world, meaning that there are no more effective drugs for treating infections caused by microbes of this type.

Increased resistance to antimicrobial drugs in production animals means, above all, increased production costs and losses, which have effects on the price of food and, at its worst, even its availability. Household pets live in close contact with people, and bacteria and resistance factors easily pass between people and pets.

Finland's extremely small pharmaceutical market is vulnerable to disruptions. Stockpiling regulations require inventories corresponding to the consumption of 6 months (public healthcare) or 10 months (pharmaceutical companies) for human antimicrobial drugs. Only critically important drugs for production animals are subject to statutory stockpiling, but the required inventory level only equals the average consumption for three months. The aim of this stockpiling is to reduce problems caused by disruptions in the international availability of antimicrobial drugs.

In global crises, the demand for ordinary antimicrobial drugs increases while their availability globally decreases due to increased demand. The production of old but efficacious antimicrobial drugs is centralising, and they are manufactured by few pharmaceutical producers. In addition, even if there are several products with the same ingredient in the market, it is possible that the active ingredient of all of these products is a single factory outside the EU.

Target of the threat

Finnish care institutions and their patients, healthy Finns and travellers. Production animals, those working with them, indirectly consumers, and pets and their owners.

Method of implementation (possible)

A microbe that is fully or almost fully resistant to all antimicrobial drugs spreads in acute hospitals and long-term care facilities. In acute hospitals, the microbe causes infections in immunocompromised patients, the treatment times become longer and some patients die from the infections. The microbe is of such nature that it is difficult to eradicate it from the care institutions. The microbe survives in the long-term care institutions and then returns to the acute hospitals with patients from them.

A microbe that is fully or almost fully resistant to all antimicrobial drugs with increased virulence spreads around the world. Finns catch it abroad or in Finland. Due to

antimicrobial drugs being inefficacious and the microbe's virulence, otherwise healthy patients succumb to infections. A microbe that is very resistant to antimicrobial drugs causes infections in outpatients that can no longer be treated with drugs used in ambulatory care. This burdens hospitals.

There is a long interruption in the production of the antimicrobial drug. There are no replacement producers or due to it being slow to scale up the production process, it takes six to twelve months for the new producers to commence operations. This makes treating infections in people or animals more difficult or prevents it.

Resistant pathogens becoming more common in production animals or pets may lead to a situation in which there are no longer any potent antimicrobial drugs for treating infections in animals. If the infection cannot be treated without antimicrobial drugs, the remaining alternative is to put the animal down. This causes losses to animal production and also has effects on food production. In this case, there may be political pressure to amend the legislation restricting the use of antimicrobial drugs.

Concatenation and recurrence of faults and disruptions

In Finland, there is currently relatively good and comprehensive monitoring of antimicrobial drug resistance in place. However, problem-causing microbes usually originate abroad, and not all countries are capable of monitoring the development of resistance. It is possible for a microbe that is fully or almost fully resistant to antimicrobial drugs to spread across the world unnoticed. Detecting and combatting an epidemic that takes place in the area of several different care institutions is difficult in Finland as well.

The development of antimicrobial drug resistance and problems with the availability of antimicrobial drugs may separately or jointly lead to a situation in which efficacious antimicrobial drugs are not available for treating infections in people and/or animals.

Antimicrobial drugs are needed during pandemic influenza to treat the sequela of influenza. Antimicrobial drug resistance and/or problems with the availability of antimicrobial drugs increase the mortality of the pandemic influenza.

A security political crisis affecting Finland directly or indirectly would probably significantly interfere with merchant shipping in the Baltic Sea and aviation to Finland, which would hinder the availability of antimicrobial drugs. An armed conflict in Finland can significantly increase the need for antimicrobial drugs.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Antimicrobial drug resistance	↑	*	*	**	*	*	**	**

4.10.2 Pandemic influenza or similar widespread epidemic

Underlying threat or threats

Pandemic influenza refers to an epidemic caused by a new subtype of the influenza A virus spreading fast across the world. In a pandemic, morbidity can be higher than in a normal seasonal influenza. According to international estimates, 25–35% of the population may fall ill, while morbidity in seasonal influenza is 5–15%. In addition, the clinical picture of the influenza can be more difficult in a pandemic influenza than in seasonal influenza. Also completely healthy adolescents and adults suffer from severe forms, not only those in risk groups based on a disease or age. There can also be other pathogens causing corresponding threats than those described above.

Target of the threat

Pandemic influenza is a significant risk from the society's point of view, as a large group of people will fall ill and many will succumb. The infection spreads easily via droplets between people, the population has no resistance against the new virus, and there is no preventive vaccine if the pandemic breaks out. The most recent extensive pandemic influenzas have broken out every 10–40 years, and the likelihood of a new influenza outbreak is high.

Method of implementation (possible)

The magnitude of the risk and severity of the pandemic are impossible to estimate in advance. The symptoms of pandemic influenza are usually similar to those of seasonal influenza, but the symptoms and sequela can be far more severe. Preventing the influenza and its spreading is successful only to a very limited extent.

After infection, there is no adequately efficacious treatment, as the current antiviral drugs can only shorten the duration of illness and reduce the likelihood of sequela.

The influenza A virus has caused four global epidemics, also known as pandemics, during the last one hundred years: in 1918–1919 (Spain), 1957–1958 (Asia), 1968–1969 (Hong Kong) and 2009–2010 H1N1 influenza (Mexico).

The most recent pandemic was caused by a new subtype of the influenza A (H1N1) virus with structures of influenza A strains typical of pigs, birds and humans, emerging in 2009. The population did not have antibodies to this virus, except for the elderly.

In addition to pandemics, the avian influenza (H5N1) was considered to be a pandemic threat in 2003–2006. Cases of avian influenza occur continuously around the world, but significant transmission of the virus from one human to another has not yet been found.

Concatenation and recurrence of faults and disruptions

A pandemic can threaten almost all vital functions of the society, not merely the healthcare system and its functioning. Critical situations occur when large groups of people fall ill at the same time. Vulnerable sectors include leadership, defence, internal security, energy supply, transports and food supply. The social, productional and economic impacts of a pandemic are significant. Personnel falling ill and personnel shortage increases the burden and risk of errors of those working.

The aim is to restrict the harmful effects on the health of the population and safeguard the functions of the society as well as possible. The most important measure in preparedness and civil protection is vaccination against the virus causing the pandemic. Vaccination is the most effective way of combatting pandemic and its spreading and harmful effects, but the development of a vaccine can begin only once the pandemic virus has been isolated. Production of a vaccine takes months, so vaccines usually cannot influence the first wave of a pandemic influenza.

Antiviral treatment of influenza, usually started as quickly as possible once the symptoms appear, can shorten the duration of illness and reduce the number of sequela. The Finnish National Emergency Supply Agency has stockpiled antiviral drugs in case of a pandemic. Antimicrobial drugs are needed in the treatment of the sequela caused by the influenza, and in addition to the public sector, also the private sector is required to stockpile them. Disruptions and problems in the availability of both vaccines and pharmaceuticals increase the magnitude of the impacts of a pandemic.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Pandemic influenza or similar widespread epidemic	—	*	*	**	**	**	**	**

4.10.3 Highly infectious severe animal disease

Underlying threat or threats

Highly infectious severe viral animal diseases can, if they spread to Finland, significantly impair the operating prerequisites of animal production, damage natural animal populations, prevent or significantly interfere with exports or trade of animals or products, and in some cases transmit from animals to people, causing people to fall severely ill.

Target of the threat

Animal farms. There are also avian influenza strains that can infect humans. They are rare, they are not discussed here.

Method of implementation (possible)

African swine fever causes a fatal haemorrhagic fever in pigs, and there is no cure or vaccine for it. The disease is transmitted via live pigs, pork and other pig products and virus-infected goods and materials. African swine fever has spread from Africa to Caucasus and from Caucasus onward west in the wild boar population since 2007. The disease also occurs in animal farms in Russia, Belorussia, Ukraine, Moldova, the easternmost parts of the EU and China. In Estonia and some Baltic countries and in Finland's neighbouring areas in Russia, there are lots of cases of African swine fever in wild boars, and to some extent also in domesticated pigs. This year, ASF infections leaped to Belgium, likely transmitted through foodstuffs. The risk of infection in Finland is through pork products and contaminated goods and via a wild boar carrying the virus.

A bigger risk of avian influenza emerged in 2005. Each year, there are cases of avian influenza at production farms in the EU. In winter 2016–2017, there were lots of avian

influenza cases. Last winter, their number was lower, but during both seasons, highly pathogenic avian influenza has been found in natural birds in Finland. Transmission to poultry farms is possible if poultry get in contact with wild birds or their faeces. At least some H5 and H7 subtypes can also transmit to humans.

Concatenation and recurrence of faults and disruptions

African swine fever and avian influenza are highly infectious animal diseases, among others. Both animal diseases cause interference to food production and the export and trade of animals and animal products. All of the animals of said species at the farm are slaughtered and the carcasses destroyed. In addition, 3-km and 10-km safeguard and monitoring zones are established, with restrictions imposed on farms within them. The farms within these zones are inspected. The disruption depends on the size of the epidemic. According to risk estimates prepared by the Finnish Food Authority Evira, the epidemics would remain small-scale in Finland. Farms struck by the animal disease will suffer major financial losses. The costs incurred due to the actions by the authorities and the fair value of the animals will be compensated for. Compensation for production losses is discretionary, and depends on e.g. the magnitude of the epidemic and the appropriations available.

Animal diseases epidemics cause difficulties in exporting products of animal origin. The financial impacts on animal production are considerable. Due to interference of production chains, disposal of animals, any loss of breeding animals, interference caused by slaughter and transport, regional transfer restrictions and consumer confidence. The disruptions in export alone very quickly amount to tens of millions of euros.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Highly infectious severe animal disease	↑	*	*	*	*	**	*	**

4.10.4 Plant hazards – plant disease epidemic

Underlying threat or threats

New plant hazards spreading to Finland or plant hazards already occurring here are estimated to increase with climate change and due to international trade. Plant hazards cause direct and indirect harm by e.g. killing plants, contaminating arable land, causing problems with the export of plants and plant products and the availability of seeds and seedlings.

Target of the threat

Crops cultivated in Finland, garden production, forests and green areas. The *Agrilus anxius* pest would target birch trees. The pine wood nematode would target pine trees. The potato wart disease would affect potato production.

Method of implementation (possible)

Several plant hazards enter Finland with plants, plant products or other goods from third countries or the EU's Single Market as trade increases. With climate change, cultivation of new plant species will begin in Finland, acting as host plant for new plant hazards and promoting them settling here.

Winters are also estimated to become milder and wetter, which increases the survival of plant hazards over the winter to the next year.

Concatenation and recurrence of faults and disruptions

If plant hazards are not detected in time, they can reproduce and possibly spread further. This makes their eradication more difficult or even fail, and they can settle in Finland. The costs of eradication are also increased.

Evira has prepared contingency plans for health hazards which are the most significant to Finland's agriculture and forestry.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Plant hazards – plant disease epidemic	↑	*	*	*	*	**	*	**

4.11 Water supply disruptions

Underlying threat or threats

A severe water supply disruption or health hazard due to water quality can be caused by natural phenomena or human activities. Disruptions caused by natural phenomena include rainstorms, floods and storms. Climate change and the increasingly common extreme weather and water conditions caused by it are also estimated to increase the risk of water supply disruption due to drought. Man-made water supply disruptions include interruptions in power supply and telecommunications, accidents at water source areas and water intake plant, faults in water intake and treatment equipment and the pipeline, accidents due to human factors and malicious acts.

Target of the threat

Large cities and towns, significant production plants, food industry in particular, social and healthcare and units and other critical services.

Method of implementation (possible)

The most significant threat involves extensive water supply or water quality disruptions affecting major urban centres. Water supply or water quality disruptions in major urban centres or services key to the functioning of the society may have significant negative effects on the functioning of the society. Water supply disruptions can be caused particularly by extensive power supply disruptions due to weather and climate factors or ageing infrastructure that cannot cope with the overload from floods and rainstorms, for example. Prolonged drought can also make water supply more difficult in Finland, especially in rural areas. An extensive water supply disruption lasting even more than twelve hours can be considered severe.

The biggest need for power in water supply is associated with the transfer of water. Pumping is required throughout the production process from water intake to purification and distribution of water. During a blackout, the network also cannot be kept under pressure, which allows harmful substances to enter the water network. Increasing floods and rainstorms may also cause significant health hazards, as large volumes of water carry solids and impurities and may cause uncontrolled wastewater emissions.

Concatenation and recurrence of faults and disruptions

Water supply disruptions are severe as they have extensive impacts on the functioning of the society. An interruption in water supply easily paralyses the provision of services, such as food production, and endangers the functioning of healthcare, for example. Supply disruptions as such can also cause qualitative hazards to water supply. Unlike a disruption involving the availability of water, deterioration of water quality can cause significant threat to life.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Water supply disruptions	↑	*	*	*	*	**	**	**

4.12 Disruptions in food supply

Underlying threat or threats

Food supply can be exposed to diverse threats that can be unintended or intentional. The threats target personnel, availability of information systems, raw materials, different phases of the production process, storage, transport and also sales to the end user.

The target can be any part of the food system, which is comprised of primary production, food industry, retail, distribution and consumption. Alternatively, it can concern an affiliated sector, such as due to an extensive power failure, pandemic or disruption of the payment system, in which case the impacts also strongly affect retail and sales.

Nature-related threats include plant diseases and pests, animal diseases and diverse threats caused by weather and climate, such as storms, drought, floods and volcanic eruptions. The last also concern Finland's food production even if they take place elsewhere in the world. Should they materialise, these threat scenarios affect food production or make deliveries, transport and distribution of raw materials more difficult.

At worst, they compromise the availability of food and cause financial losses to producers and the national economy on the whole.

Increasing with climate change, extreme weather and water condition phenomena hinder food production in the world's strong food production areas in the long term. At the same time, the world's population is increasing, groundwater reserves are used in an uncontrolled way and land use is becoming more difficult. The risk of crises and conflicts caused by food and water shortage increases. In Finland, probable warming up of the winter season, increasing rainfall and strong winds will increase the risks to the society and economy.

Foods may be contaminated and spoil due to different reasons in different phases of the process. There can be a technical fault in the production process that is not noticed early enough, or the raw material could include a pathogen already when entering the process. However, it is the benefit of the food system that problems affecting a single food chain or company do not prevent the availability of food. The financial losses can be significant and result in major restructuring. The food offering can be restricted and simplified in disruptions. Food safety is very highly supervised. Most commonly, foodstuffs are contaminated when a microbiological, chemical or physical hazard enters the process (e.g. salmonella, EHEC and listeria bacteria). In Finland, this is very rare, and recalls work effectively.

Target of the threat

Food industry, distribution networks, agricultural and greenhouse companies, retail, professional kitchens and citizens.

Method of implementation (possible)

The risks affecting the operations of the food sector can target the production inputs, transport, data traffic and information systems or directly the production and distribution process. At worst, they can prevent food supply. The raw materials or finished products can end up in the wrong places, or the delivery or sale of the products is prevented. Manipulating the production process, such as by altering the amounts of chemicals, can

cause severe consequences, such as illness or even deaths. The difficulty of detection or it remaining undetected can make the situation serious.

Concatenation and recurrence of faults and disruptions

What makes a cyber attack difficult is that if it spreads, it can paralyse several production plants almost simultaneously. Correspondingly, disruptions in telecommunications and information and payment systems immediately prevent the citizens from obtaining foodstuffs in the normal way and the functioning of food services. In addition, such disruptions prevent the operations of also professional and large-scale kitchens and wholesale operations. A short-term stop does not severely compromise the functioning of food supply, but non-existent stockpiles in all parts of the chain will lead to disruptions in a few days. If the situation is prolonged, food supply is compromised.

In case of an extensive epidemic caused by foodstuffs and there is no certainty of the cause, it burdens healthcare services and can test the citizens' psychological resilience to crisis. Loss of consumer confidence in food safety and availability may lead to unrest and disturbances, if trust in the authorities is deteriorated at the same time.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Disruptions in food supply	↑	*	*	*	*	**	**	**

4.13 Large-scale accidents

4.13.1 Maritime multi-sector accident

Underlying threat or threats

The Baltic Sea is a sea region with significant maritime traffic volumes throughout the year. Channels that are difficult to navigate and dark and wintry conditions impose challenges on navigation and increase the threat of maritime accidents.

A strong growth in the volume of oil and chemical transports in the Baltic Sea has increased the possibility of severe environmental accidents. As the result of a maritime shipping accident or ground-based oil or chemical spill, significant amounts of oil, oil products or chemicals can end up in the sea.

The volumes of maritime transports are expected to increase by approximately 30–50% from the level of 2010 by 2030. Increased traffic volumes increase the risk of maritime accidents in the area. The growth is estimated to focus particularly on container traffic. The volume of oil transports is, on the other hand, expected to decrease slightly with replacement fuels, such as liquefied natural gas (LNG) and biofuels, becoming more common.

The strongest growth in maritime traffic in the Baltic Sea region will take place in the Gulf of Finland and southern Baltic Sea. Rapid fluctuations in the global economic policy, oil price, international crises and terrorism can also change the situation rapidly.

Also, an increase in maritime technology can have effects on the threat of maritime accidents. Technology associated with the management of vessels and navigation aids failing on narrow or heavily trafficked lanes can have serious consequences. In addition, in the long term, the development of the automation of maritime traffic can bring about new kinds of vulnerabilities that cannot be yet properly estimated.

On the other hand, the automation of maritime traffic may reduce the threat of accidents caused by human errors.

Target of the threat

The threat primarily concerns people and the environment. With regard to people, the most severe accident types taking place in the sea area are vessels capsizing or sinking due to running grounding, bottom contact or collision and uncontrolled fire aboard a vessel. Onboard fires are the most significant threat when loss of life or severe injury are concerned. The worst-case scenario is the evacuation of a passenger vessel under difficult conditions or collision between a passenger vessel and oil tanker/vessel carrying chemicals.

In an oil and chemical accident, the target of the threat depends on the spreading of the spill and exposure of people and ecosystems to the different components of the spill. Oil ending up in the sea as the result of a major accident ends up on shores to a large extent.

A small fraction sinks, while certain components dissolve in water or evaporate. In case of a fire, fire gases spread into the air.

An oil and chemical accident can cause diverse impacts on ecosystems, and they are often difficult to detect and prevent. The ecological impacts are both quick and direct as well as long-term and indirect. The ecological impacts of an oil accidents on a population adapted to the Baltic Sea can be very severe, even permanent. Due to the poor condition of the Baltic Sea, even slight additional contamination can be fatal. In addition to the vessels in traffic in the Baltic Sea, there are an estimated 22 high-risk shipwrecks in Finland's territorial waters, with probably up to 200 tonnes of oil. In addition, as many wrecks with over a hundred tonnes of heavy fuel oil but involving less risk are known.

Method of implementation (possible)

The worst-case scenario assessed involves two vessels, at least one of which is a large passenger ship. The other one can be a vessel carrying hazardous substances or another large passenger ship. The total number of people to be evacuated can be 6,000.

In accidents involving oil and chemical transport vessels, the most significant threats are related to tankers grounding, colliding and fires. Ground-based spills originate in production plants and storage areas. In both cases, human factors and technical failures play a significant role in peacetime accidents. Technical faults aboard vessels include faults in the engine, propulsion, steering or navigation systems.

Underlying major land-based spills there are often operating faults with equipment used for transferring oil or chemicals or leaks in pipelines or tanks.

Concatenation and recurrence of faults and disruptions

The after-treatment of a major environmental accident can take months, even years. Cleaning and restoring contaminated environment place a burden on the resources available. Waste treatment, for example, requires large interim storage and retention areas and causes logistical challenges. In addition to environmental damage, the financial damage to businesses and especially tourism in the area can be significant.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Maritime multi-sector accident	↑	**	*	*	**	***	*	**

4.13.2 Severe nuclear power plant accident in Finland or Finland's neighbouring areas

Underlying threat or threats

There are four nuclear power plant units in Finland: two in Loviisa and two in Olkiluoto. In addition, a new unit, Olkiluoto 3, is about to be started in Olkiluoto. One plant unit is also being planned in Pyhäjoki.

Finland's neighbouring area includes the Russian Leningrad (Sosnovyi Bor) and Kola plants and the Swedish Forsmark plant. Severe accidents taking place in these plant locations may, depending on the weather conditions, also have radiation effects requiring extensive protective measures in Finland as well.

Target of the threat

In a severe nuclear power plant accident in Finland or Finland's neighbouring areas, large amounts of radioactive materials can be released to the environment. Managing the radiation hazard requires action at all administrative levels and sectors. The measures can be considerable, requiring extensive investment by the society in preventing and mitigating the harmful effects.

An emerging radiation hazards requires quickly protecting people and launching protective measures concerning food and other production. In addition, measures concerning agriculture and forestry, food industry and other industry, water supply, traffic (road, air, maritime and rail traffic),

leisure activities, trade, transport, import and export, cleaning of buildings and the environment and waste treatment and disposal, may be required. Various measures may be necessary in distances of up to hundreds of kilometres from the accident site.

Managing the situation can also take a very long time: cleaning the environment and restoring normal living conditions, ensuring the cleanliness of foodstuffs and water and management of waste containing radioactive materials can take years. Recovery from the situation can take decades.

Method of implementation (possible)

In case of technical fault, the reactor can be stopped with high reliability. After stopping, cooling of the reactor is required to remove post-shut-down heat. A severe nuclear power plant accident can occur if the cooling of the reactor is lost and the tightness of the pressure-resistant structures surrounding the reactor is lost. Nuclear power plants have multiple independent safety systems operating through different means to prevent accidents.

However, the possibility of severe accidents cannot be fully excluded, as the mechanism of occurrence of an accident can be a combination of an initial event and consequences not identified before.

Intentionally damaging a nuclear power plant by damaging the reactor or its cooling systems can lead to significant radioactive emissions. In this case, the systems of the nuclear power plant are made inoperable with an external attack and possibly an assistant with the required know-how.

All nuclear power plants have effective security arrangements which have made such threats very improbable.

A plane colliding with a nuclear power plant is not likely to damage the actual nuclear reactor, but the fuel in a large passenger plane causes a fire that can lead to an accident in very unfavourable conditions. In addition, the spreading of the emission into the environment cannot be prevented in this case as the shielding building has been damaged.

Serious natural accidents can also trigger a nuclear power plant accident under extreme conditions, such as in Fukushima in 2011. Analyses made in the EU countries following the Fukushima accident of the impacts of extreme natural phenomena on nuclear safety, among other things, brought up improvement needs at various plants, including Finland's own nuclear power plants. Each country has prepared its own national action programme covering the required measures.

Concatenation and recurrence of faults and disruptions

A severe nuclear power plant accident can cause a significant long-term reduction in Finland's power production, especially if the other plant units of the plant need to be shut down. In addition, the reassessment of the safety of nuclear energy can lead to a temporary shutdown of nuclear power plants. An accident would also give cause for assessing the justification or general approval of the use of nuclear energy and thereby influence Finland's future energy policy.

The direct health impacts of a radiation hazard will probably remain low, if there is success in the protection measures. However, the hazard would have significant effects on people's living conditions and environment, as well as significant psychological and social negative effects. After the Fukushima accident, changes have been observed in the evacuees' health, such as increased diabetes and cardiac disease due to the changed habits.

The economic impacts are extensive with regard to after-care and recovery, particularly due to the long-term nature of the situation. The scenario will also have effects on all kinds of production, which will be suspended in the hazard area. The society's support would be needed for restarting production once the area has been made safe again.

Finnish exports would also suffer in case of a radiation hazard. Based on the experience gained from the Fukushima and Chernobyl nuclear power plant accidents, other countries would probably require cleanliness certificates or measurements of all goods exported from Finland.

Assessment of the trend of likelihood and impact

- The trend of likelihood was estimated to increase

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Severe nuclear power plant accident in Finland or Finland's neighbouring areas	—	**	*	**	**	***	***	***

APPENDICES

Table 1. Summary table of the assessment of the trend of likelihood and impact

Threat scenario/disruption	Trend of likelihood	Impacts of the threat scenario/disruption on vital functions						
		Leadership	International and EU activities	Defence capability	Internal security	Economy, infrastructure and security of supply	Functional capacity of the population and services	Psychological resilience
Information operations	↑	**	**	**	**	**	**	***
Political, financial and military pressure	↑	***	**	**	**	***	**	***
Use of military force	—	***	***	***	***	***	***	***
Large-scale immigration	↑	**	**	*	***	*	***	**
Terrorist act targeting the structures of the society or large crowds	—	**	*	**	***	*	*	***
Violent, large-scale civil disturbances	—	**	*	**	***	*	**	***
Disruption of the public economy	—	*	**	**	**	**	**	***
Disruption of the financial system	—	*	**	**	**	***	**	***
Major disruption in power supply	—	**	*	*	**	***	***	**
Disruption in the availability of fuels	—	*	*	**	**	***	**	**
Severe disruptions in communications networks and services	↑	**	*	**	***	***	***	**
Disruptions in logistics	—	*	**	**	**	***	***	**
Antimicrobial drug resistance	↑	*	*	**	*	*	**	**
Pandemic influenza or similar widespread epidemic	—	*	*	**	**	**	**	**
Highly infectious severe animal disease	↑	*	*	*	*	**	*	**
Plant hazards - plant disease epidemic		*	*	*	*	**	*	**
Water supply disruptions	↑	*	*	*	*	**	**	**
Disruptions in food supply	↑	*	*	*	*	**	**	**
Maritime multi-sector accident	↑	**	*	*	**	***	*	**
Nuclear power plant accident in Finland or Finland's neighbouring areas	—	**	*	**	**	***	***	***



Ministry of the Interior
Finland

Ministry of the Interior PL 26, 00023 Valtioneuvosto

www.intermin.fi