Government data-driven decision-making (DDDM) framework implementation. Test case: crisis management

Deliverable 2.2: Risk mapping and disaster loss data management: Catalogue of

Technical Support Instrument

Supporting reforms in 27 Member States

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Glossary

Term	Definition
Risk	An effect of uncertainty on objectives. Risk is usually expressed in terms of risk sources, potential events, their consequences, and their likelihood.[1]
Risk management	Coordinated activities to direct and control an organization with regard to risk.[1]
Disaster risk	The potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity. Disaster risk comprises different types of potential losses which are often difficult to quantify. Nevertheless, with knowledge of the prevailing hazards and the patterns of population and socioeconomic development, disaster risks can be assessed and mapped, in broad terms at least.[2]
Crisis	An unstable condition involving an impending abrupt or significant change that requires urgent attention and action to protect life, assets, property, or the environment.[3]
Vital service	A service that has an overwhelming impact on the functioning of society and the interruption of which is an immediate threat to the life or health of people or to the operation of another vital service or service of general interest.[4]
Compound risk	When multiple risks occur simultaneously, or one after another.[5] Compound risk events enlarge the consequences of the risk events and make the emergency more difficult to deal with. Compound risks have a combination of multiple drivers and/or hazards that contribute to societal or environmental risk.[6]
Continuity of a vital service	The capability of the provider of the vital service to ensure continuous operation and to restore continuous operation after an interruption of the vital service. The providers of vital services are usually public companies. The responsibility of assuring the continuity of these services is given out to specific authorities.[7]
Disaster loss methodology	Disaster loss methodology aggregates the losses suffered as a result of a disaster event. Most commonly, disaster loss is calculated for human, physical and economic losses. Disaster loss can be

[1] The International Organisation for Standardisation “ISO31000:2018 - RISK MANAGEMENT”

[2] UN Office for Disaster Risk Reduction https://www.undrr.org/terminology/disaster-risk

[3] The International Organisation for Standardisation “ISO/DIS 22300 Security and resilience – Terminology”

[4] Riigi Teataja, “Emergency Act,“ published June 13, 2017, https://www.riigiteataja.ee/en/eli/513062017001/consolide

[5] Dale Willman, “Double Trouble: The Importance of Thinking About Compound Risk,“ Columbia Climate School, published August 11, 2017, https://news.climate.columbia.edu/2020/08/11/compound-risk-hurricanes-wildfires/#:~:text=Compound%20risk%20%E2%80%94%20when%20multiple%20risks,at%20Columbia%20University's%20Earth%20Institute.

[6] Jakob Zscheischler, Olivia Martius, Seth Westra. et al., “A typology of compound weather and climate events,” Nat Rev Earth Environ, no. 1 (2020): 333-347, https://www.nature.com/articles/s43017-020-0060-z

[7] Riigi Teataja, “Emergency Act,“ published June 13, 2017, https://www.riigiteataja.ee/en/eli/513062017001/consolide

Term	Definition
	accounted for, after the event takes place, but also potential loss can be estimated based on a risk scenario. Once this is used in disaster risk management it allows to analyse avoided losses.
Disaster loss accounting	it is the primary motivation for recording disaster loss with the aim to document the trends and aggregate statistics informing local, national and international disaster risk reduction programmes;[8]
Disaster risk	The potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity. The definition of disaster risk reflects the concept of hazardous events and disasters as the outcome of continuously present conditions of risk. Disaster risk comprises different types of potential losses which are often difficult to quantify. Nevertheless, with knowledge of the prevailing hazards and the patterns of population and socioeconomic development, disaster risks can be assessed and mapped, in broad terms at least. [9]
Disaster risk modelling	It aims to improve risk assessments and forecast methods. Loss data is used to infer vulnerabilities and to identify sectoral areas for disaster risk reduction and mitigation measures.[10]
Damage	The total or partial destruction of physical assets and infrastructure in disaster-affected areas, expressed as replacement and/or repair costs. In the agriculture sector, damage is considered in relation to standing crops, farm machinery, irrigation systems, livestock shelters, fishing vessels and ponds.[11]
Interdependency of services	Dependency of service providers on other services, resources etc. Disruptions in one service may lead to disruptions in others.
Loss	Quantifiable measures expressed in either monetary terms (e.g., market value, replacement value) for physical assets or counts such as number of fatalities and injuries.[12]
A risk of an emergency	A situation where based on an objective assessment of the circumstances it may be considered likely that an event or a chain of events or an interference with a vital service may escalate into an emergency in the near future.[13]

[8] Tom De Groeve, Karmen Poljansek, Daniele Ehrlich, “Recording Disaster Losses: Recommendations for a European approach,” Joint Research Centre – Institute for the Protection and the Security of the Citizen, published 2013, https://reliefweb.int/sites/reliefweb.int/files/resources/lbna26111enn.pdf.

9 https://www.unisdr.org/files/globalplatform/591f213cf2fbe52828_wordsintoactionguideline.nationaldi.pdf

[10] Tom De Groeve, Karmen Poljansek, Daniele Ehrlich, “Recording Disaster Losses: Recommendations for a European approach,” Joint Research Centre – Institute for the Protection and the Security of the Citizen, published 2013, https://reliefweb.int/sites/reliefweb.int/files/resources/lbna26111enn.pdf.

[11] Piero Conforti, Mira Markova, Dimitar Tochkov, “FAO’s methodology for damage and loss assessment in agriculture,” Food and Agriculture Organization of the United Nations, published 2020, https://www.fao.org/documents/card/en/c/ca6990en/.

[12] Preventionweb, “Handbook for Estimating the Socio-economic and Environmental Effects of Disasters,” published 2003, https://www.preventionweb.net/files/1099_eclachandbook.pdf

[13] Riigi Teataja, ”Emergency Act,“ published June 13, 2017, https://www.riigiteataja.ee/en/eli/513062017001/consolide

Term	Definition
An emergency	An event or a chain of events or an interruption of a vital service which endangers the life or health of many people, causes major proprietary damage, major environmental damage, or severe and extensive interferences with the continuity of vital services and resolution of which requires the prompt coordinated activities of several authorities or persons involved by them, the application of a command organisation different from usual and the involvement of more persons and means than usual.[14]
Crisis management	A system of measures which includes preventing, preparing for and resolving an emergency.[15]
Vulnerability assessment	The vulnerability analysis aims at analysing, in detail, how seriously and extensively a specific incident affects society or the organisation. Various vulnerabilities are identified with the help of the analysis. An important difference between a vulnerability analysis and a risk analysis is that the former is carried out with regards to a specific risk scenario identified in the risk analysis. In addition, the vulnerability analysis analyses one or more scenarios with the intention of identifying various vulnerabilities in more detail than in the initial risk analysis. Capacity assessment is a form of vulnerability analysis[16]

[14] Riigi Teataja, ”Emergency Act,“ published June 13, 2017, https://www.riigiteataja.ee/en/eli/513062017001/consolide
[15] Riigi Teataja, ”Emergency Act,“ published June 13, 2017, https://www.riigiteataja.ee/en/eli/513062017001/consolide
[16] MSB Guide to Risk and vulnerability analysis

Abbreviations

Term	Definition
BA	Bank of Estonia
DDDM	Data-driven decision-making
DG	Data Governance
EB	The Environmental Board
EC	European Commission
ErSS	The State of Emergency Act (Erakorralise seisukorra seadus)
EU	European Union
GDPR	General Data Protection Regulation
GO	Government Office
HB	The Health Board
HOLP	Emergency Response Plan (Hädaolukorra lahendamise plaan)
HOS	Emergency Act (Hädaolukorra seadus)
ISA	Information System Authority
ISS	The Internal Security Service
KOKS	The Local Government Organisation Act (Kohaliku omavalitsuse korralduse seadus)
LB	The Land Board
MoC	Ministry of Culture
MoE	Ministry of Environment
MoEC	Ministry of Economic Affairs and Communications
MoF	Ministry of Finance
MoS	Ministry of Social Affairs
PBGB	The Police and Border Guard Board
PwC	PricewaterhouseCoopers
RB	The Rescue Board
RfS	Request for Service
RiKS	The National Defence Act (Riigikaitse seadus)
SE	Statistics Estonia
SIB	Social Insurance Board
VFB	The Veterinary and Food Board
VOS	The Preparedness Law (Valmisolekuseadus)

Executive summary

Purpose of the report

The report has been drafted for the purpose of setting out necessary requirements of the crisis management tool and disaster loss methodology which will be developed within the Project. This report also gives an overview of the crisis management system in Ireland, Sweden and the Netherlands which have been highlighted as flagship countries of crisis management in the EU.

The aim of the foreign practice review is to learn from their experience and take over some of their practices to the Estonian risk and crisis management process, methodologies and tools. Potential improvements could be related to the general build-up system as well as to the methodologies used for carrying out risk analysis or building a disaster loss methodology.

The report also covers the requirements and expectations for the new Estonian crisis management tool. The aim is to define the general and functional requirements of the Local Municipalities' crisis management toolbox and the disaster loss methodology.

Scope of the report

This report has been developed within the Project carried out by PricewaterhouseCoopers EU Services EESV (hereinafter – PwC) on behalf of the DG REFORM, according to the specific contract No. REFORM/SC2021/076 (21EE02), signed on 14 October 2021. The report covers the items required in the Request for Service (RfS).

This report covers the Outcome 2 (and 3) of the Project – **Crisis management.** A separate report is issued for Outcome 1 and all combined reports make up the complete package of deliverables.

The Estonian Government has an objective to improve the national crisis management and resilience by increasing national risk awareness. As agreed, the Project aims to: 1) create a common methodology for local municipalities to improve their risk awareness and 2) introduce a systematic disaster loss methodology for state authorities.

Document analysis, interviews (both group and individual) with various stakeholders and co-creation sessions were conducted to obtain the understanding of the foreign best practice and create the functional and other requirements for the local municipalities' crisis management tool and disaster loss methodology.

Key findings and recommendations

General findings and recommendations:

- The methodology and crisis management tool should functionally cover three thematic areas: risk awareness, crisis preparedness and disaster loss methodology; for two separate target groups – local municipalities and responsible agencies. In the case of local municipality governments, the focus is on raising and harmonising risk awareness and risk mapping as well as assessing of their preparedness to crisis events. In the case of emergency respondent authorities, the methodology must ensure a systematic assessment of the magnitude of disaster loss, i.e. the impact of the risk events. Increased understanding of the potential crisis impacts could lead to more effective preparedness activities.
- Foreign practice review shows that regional level plays an important role in crisis management. The regions co-ordinate and support the work of local governments and bring together a regional view. It becomes more relevant for the regions than at the local municipality level and the regional level has more capacity to respond to risks. In order to increase the risk management capacity also in Estonia, specifically in smaller local governments, it would be worth considering strengthening the role of the regional crisis management level (e.g. by increasing the role of regional units of emergency respondent authorities, such as the RB or regional crisis committees). This would allow to fulfil the principle of proximity when dealing with emergencies.

- Foreign practice review shows that co-operation and information exchange between different levels of crisis management system in other countries is greater than in Estonia, operating both top-down and bottom-up, but also horizontally. The risk lists and the results of risk analysis are available to other authorities, even if they are not shared to the general public. The risk analyses of one institution are the input for other institutions and complement each other. An important prerequisite for the information exchange is the introduction of a standardised approach and harmonised risk assessment scenarios.
  In addition, foreign practice reveals greater involvement of other stakeholders (including private sector participants) in the risk and vulnerability analysis. This can specifically be applied in Estonia through the better involvement of vital service providers in the execution of risk assessments.
- Foreign practice review shows that countries use motivating (additional) budgets from the national funds to promote crisis management at the local government level. Such practice is currently not in use in Estonia. In Sweden, for example, it is possible to reduce the budgets of parties that have not met their crisis management objectives or to compensate for additional risk management activities. In the Netherlands, 15% of the Safety Region's funding comes from the state.
- Both local governments and emergency respondent authorities should extend their existing risk management analysis to include **vulnerability assessment**. Vulnerability assessment helps to identify areas and activities that may be problematic while responding to an acute crisis, such as lack of know-how or information, skills shortages, insufficient equipment, resources, people, etc.

Findings and recommendations regarding the local municipality's risk assessment toolbox:

- Based on foreign practice review it may be concluded that the application of the risk assessment methodology does not necessarily have to be mandatory by the law for local governments if other mechanisms are in place to ensure the implementation. The use of the tool can be framed as a supporting activity which helps the local government to better fulfil its obligations already prescribed by the law (e.g. to support the preparation of the annual work plan of the crisis committee or to ensure the sustainable provision of local government services). In our opinion, the Rescue Board has an important role in introducing the methodology which can internally direct the crisis preparedness activities of local governments through the local crisis committees.
- The aim of the risk assessment methodology of local governments must be to **promote risk-based thinking** among local government leaders. As a result of the methodology, the production of the risk analysis output is helpful in documenting the activities and storing information, but the discussion during the process both within the municipality and with the involved partners is even of greater value. To achieve this goal the methodology should **include samples and guidance material to trigger discussions**, rather than simply filling in predefined risk assessment forms.
- In order to ensure better completeness of local municipality's risk profile, **standardised local municipality's profile should be created**. This should include main characteristics of the local municipality (such as demographics, geographics and landscape, economic drivers, key infrastructure, etc). In addition, **predefined base risk lists (all hazards approach)** should be created, so that the local municipalities could more easily ensure that no important risks are overlooked.
- Foreign practice reveals that it is **necessary to perform periodic mapping of resources** to be deployed in a crisis event (such as equipment, specific inventory or human resource).
- Considering the current level of local governments' crisis management maturity, we foresee that local governments shall use **scenario-based approach** to risk and vulnerability assessment and identifying the necessary follow-up activities.

Findings and recommendations regarding the disaster loss methodology and data management system:

- Foreign practice review confirms that it is reasonable to **assess disaster loss in three categories**: human loss, damage and economic loss**.** In addition, the analysis of foreign practice reinforced the notion that the disaster loss assessment should **not be a process independent from the usual risk assessment**, but a supplementary tool for conducting a more data-driven risk assessment.
- **Disaster loss assessment methodology shall be a tool designed for emergency respondent authorities.** The needs and abilities of local governments to assess disaster loss at the local level is different among the municipalities. Wide cross-sectoral damage assessment cannot be within their competence. Although, **the disaster loss methodology could systematically be one of the modules of the local government risk management tool,** its usage is not relevant for the most local governments. The emergency respondent authorities should use the module in the framework of their own national emergency risk analysis and could either involve larger local governments in the implementation of the methodology or at least inform them of the assessment results (similar to the MoE flood risk assessment).
- Based on the current organisational model, there are several clear authorities that could be the logical administrators or the drivers of the local municipalities' crisis management toolbox (the RB or the MoF's MinuOmavalitsus.ee). **However, currently there is no clear driver for a disaster loss methodology which would co-ordinate the development of the methodology and the national data management**. The appointment of the co-ordinator (authority) responsible for the disaster loss methodology in the next stages of the Project is a critical success factor.

Lühikokkuvõte

Aruande eesmärgid

Käesoleva aruande eesmärk on panna paika kohalike omavalitsuste kriisijuhtimise ja kriisikahjude hindamise süsteemi tööriistade funktsioonid, nõuded ja vajadused. Lisaks annab aruanne ülevaate kriisijuhtimise praktikatest Iirimaal, Rootsis ja Hollandis, mis on erinevate osapoolte poolt esile tõstetud kui EL kriisijuhtimise lipulaevu. Rahvusvahelise praktika kaardistuse eesmärk on tuvastada lähenemisviise, mida üle kanda ka Eesti kriisijuhtimise süsteemi. Rahvusvahelise praktika kaardistuse kaudu saab välja tuua parendusettepanekud seoses Eesti kriisijuhtimise süsteemi ülesehitusega, aga üle saab kanda ka metoodikaid, mida kasutatakse riskianalüüsi läbiviimiseks või kriisikahjude hindamiseks.

Aruanne annab ka ülevaate nõuetest, mida turuosalised seavad uutele Eesti kriisijuhtimise tööriistadele, sh vajadused seoses KOV kriisijuhtimise tööriista ja kriisikahjude hindamise metoodika ja andmehaldusega. Aruanne toob välja funktsionaalsuse ja teemad, mida metoodika peaks katma, samuti ka nõuded, mis on ülesannete elluviimiseks vajalikud.

Aruande ulatus

Aruanne on koostatud Euroopa Komisjoni struktuurireformide toe peadirektoriaadi (DG REFORM) tellimusel ja PricewaterhouseCoopers EU Services EESV (edaspidi – PwC) poolt läbiviidud projekti raames vastavalt 14. oktoobril 2021 allkirjastatud erilepingule nr REFORM/SC2021/076. (21EE02) Aruande koostamisel on lähtutud Projekti lähteülesandes esitatud nõuetest.

Antud aruanne hõlmab projekti 2. (ja 3.) tulemit – **kriisijuhtimine**. Eraldi aruanne koostatakse projekti 1. tulemi kohta ja antud aruanded moodustavad kokku kogu projekti tulemite kogumi.

Eesti valitsus on võtnud eesmärgiks parandada riiklikku kriisijuhtimist ja valmisolekut riikliku riskiteadlikkuse tõstmise kaudu. Projekti eesmärgid on vastavalt kokkulepitule 1) luua kohalikele omavalitsustele ühtne metoodika riskiteadlikkuse tõstmiseks, hindamiseks ja 2) luua riigiasutustele süstemaatiline kriisikahjude kvantifitseerimise metoodika.

Rahvusvahelise praktika kaardistamiseks ja tööriistade nõuete kaardistamiseks viidi läbi dokumentide analüüs, intervjuud ja koosloome töötoad erinevate osapooltega.

Tähelepanekud ja soovitused

Üldised tähelepanekud ja soovitused:

- Loodav metoodika ja kriisijuhtimise tööriist peab funktsionaalselt katma kolme teemavaldkonda – riskiteadlikkus, kriisideks valmisolek ja kriisikahjude hindamine – ja olema suunatud kahele sihtrühmale. KOV-ide tarbeks on fookuses riskiteadlikkuse tõstmine ja ühtlustamine ning oma valmisoleku kaardistamine ja hindamine kriisisündmustele reageerimiseks. Hädaolukorra riskianalüüsi koostamist juhtivate riigiasutuste (vastutavate asutuste) tarbeks peab metoodika tagama kriisikahjude suuruse ehk riski tagajärje süstematiseeritud hindamise. Kriiside tagajärgede mõistmine aitab efektiivsemalt kriisideks valmistuda.
- **Välispraktikast nähtub, et riskide juhtimisel on oluline roll regiooni tasandil**. Regioonid koordineerivad ja toetavad omavalitsuste tööd ja koondavad kokku regionaalse vaate. Kuivõrd regioonid on suuremad, siis on nende jaoks relevantsemad suurem hulk riske ja neil on rohkem võimekust nendega tegeleda kui väikestel KOV-idel eraldi. Et tõsta riskijuhtimise võimekust ka Eestis, sh just väiksemates omavalitsustes, tasuks kaaluda regionaalse kriisijuhtimise tasandi rolli tugevdamist (nt läbi vastutavate asutuste regionaalsete üksuste nt Päästeameti või regionaalsete kriisikomisjonide rolli suurendamise). See aitaks edukalt täita ka läheduse põhimõtet.

  Välispraktikast nähtub, et koostöö ja infovahetus erinevate kriisijuhtimise tasandite vahel on välisriikides suurem kui Eestis, toimides nii ülevalt alla kui ka alt üles, aga ka horisontaalselt. Erinevate osapoolte poolt kasutatavad riskide nimekirjad ja analüüside tulemused on kasutatavad ka teistele asutustele isegi kui need pole avalikult kommunikeeritud. Ühe asutuse riskianalüüsid on

sisendiks teistele asutustele ja täiendavad teineteist. Infovahetuse oluliseks eelduseks on standardiseeritud lähenemise ning ühtlustatud riskistsenaariumite kasutuselevõtt. Lisaks selgub välispraktika kaardistusest, et olulisem on muude osapoolte (sh erasektori) kaasamine riskianalüüsi ja haavatavatuse hindamise läbiviimisesse. Eesti kontekstis tuleks mõelda, kuidas saaks riskianalüüside läbiviimisesse senisest enam kaasata elutähtsate teenuste pakkujaid.

- Välispraktikast nähtub, et riigid kasutavad KOV-i tasandil kriisijuhtimisega tegelemise edendamiseks motiveerivaid (lisa)eelarveid riiklikest vahenditest. Eestis ei rahastata süsteemselt KOV-ide kriisijuhtimise tegevusi. Näiteks Rootsis on võimalik kriisijuhtimise eesmärke täitmata jätnud osapoolte eelarvet vähendada või kompenseerida täiendavaid tehtud riskijuhtimise tegevusi. Hollandis tuleb *Safety Region*-i rahastus 15% ulatuses riigilt.
- Nii KOV-id kui ka vastutavad asutused peaksid laiendama oma senist riskijuhtimise analüüsi ka **haavatavuste analüüsiga**. Haavatavuse analüüs aitab tuvastada valdkondi ja tegevusi, mille rakendamisel akuutsele kriisile reageerides võib esineda probleeme, nt teadmatus, infopuudus, oskuste puudujääk, varustuse, vahendite või inimeste ebapiisavus jms.

KOV riskihindamise tööriistaga seonduvad soovitused ja tähelepanekud:

- Välispraktikale tuginedes saab öelda, et riskihindamise metoodika rakendamine ei pea olema omavalitsustele tingimata seadusega kohustuslik, kui KOV-ide motiveerimiseks kasutatakse teisi mehhanisme. Tööriista kasutamist tuleks raamistada kui toetavat tegevust, mis aitab KOV-il paremini teostada juba seadusega ette nähtud kohustuste täitmist (nt toetada aastase kriisikomisjoni tööplaani ettevalmist või KOV teenuste jätkusuutliku osutamise tagamist). Metoodika juurutamisel on meie hinnangul tähtis roll Päästeametil, kes saab sisemiselt suunata omavalitsuste kriisivalmisoleku tegevusi läbi kohalike (nii regionaalsete kui ka omavalitsuste) kriisikomisjonide.
- KOV-ide riskihindamise metoodika eesmärk peaks olema **edendada riskipõhist mõttetegevust** omavalitsuse juhtide seas. Metoodika tulemusel riskianalüüsi väljundi tootmine on abiks tegevuste ja informatsiooni talletamisel, kuid suuremat väärtust omab ka protsessi läbitegemisel toimuv mõttevahetus ja diskussioon nii omavalituse sees kui ka kaasatud partneritega. **Sellest tulenevalt peab ka metoodikas olema oluline koht näidistel ja diskussiooni suunavatel materjalidel**, et käivitada arutelusid, mitte lihtsalt täita etteantud riskihinnangu vormi.
- Tagamaks kohalike omavalituste riskiprofiili terviklikkus, **tuleks luua ka standardiseeritud kohaliku omavalitsuse profiil.** See peaks sisaldama peamisi omavalitsust iseloomustavaid mõõdikuid (sh demograafilised näitajad, geograafiat ja looduskeskkonda puudutavad näitajad, majandusnäitajad, kriitiline infrastruktuur jms). Lisaks peaks riskiprofiil sisaldama terviklikku ette määratud riskide nimekirja, et KOV-idel poleks võimalik mõningate riskide analüüsimisest kõrvale hoiduda.
- Rahvusvahelise praktika kaardistus rõhutab kriitiliste (kriisiolukorras kasutatavate) ressursside kaardistamist. Nende hulka kuuluvad näiteks tehnoloogilise vahendid, varu ja inimressurss).
- Arvestades tänast KOV-ide võimekuste taset, soovitame KOV-idel läheneda riskide ja haavatavuste hindamisele ning vajalike jätkutegevuste tuvastamisele **stsenaariumipõhiselt**.

Kriisikahjude hindamise metoodikaga seonduvad soovitused ja tähelepanekud:

- **Välisriikide praktika kinnitab, et kriisikahjusid on mõistlik hinnata kolmes kategoorias**: inimkahjud (*human loss*), otsesed füüsilised kahjud (*damage*) ja majanduslik kahju (*economic loss*). Lisaks kinnistas välispraktika analüüs arusaama, et kriisikahjude hindamine ei saa olla tavapärasest riskihindamise läbiviimisest eraldiseisev protsess, vaid täiendav tööriist, mis võimaldaks viia läbi andmepõhisemat riskide hindamist.
- **Kriisikahjude hindamise metoodika peaks olema vastutavatele asutustele disainitud tööriist**. Kohalike omavalitsuste vajadus ja võimekus kriisikahjusid kohaliku tasandil hinnata on erinev ning valdkonnaülene kahjude hindamine ei saa olla nende pädevuses. **Kriisikahjude hindamise metoodika võiks küll süsteemselt olla ka üks moodul KOV-ide riskijuhtimise tööriistast**, kuid selle rakendamine täies ulatuses pole enamikule KOV-idele relevantne. Vastutavad asutused peaksid moodulit kasutama enda riigiülese hädaolukorra riskianalüüsi koostamise raames ning võiks

metoodika rakendamisel kas suuremaid KOV kaasata või vähemalt neid hindamise tulemustest informeerida (sarnaselt KeM üleujutusriski kahjude hindamisele).

- KOV metoodika väljatöötamisel on lähtuvalt tänasest korraldusmudelist mitu selget osapoolt, kes oleks metoodika loogilised haldajad või süsteemi ülalhoiu tagajad (PäA või RaM-i MinuOmavalitsus). **Kriisikahjude hindamise metoodika puhul pole täna selget eestvedajat**, kes sooviks koordineerida metoodika arendust ja üleriigilist andmehaldust. Selge kriisikahjude metoodika koordinaatori määramine on kriitiline edutegur, millele tuleb projekti järgmistes etappides tähelepanu pöörata.

Table of Contents

1 Introduction

1.1 Scope of the report

1.1.1 Purpose and Outcome

The report has been drafted for Outcomes 2 (and 3). Outcome 1 is disclosed in a separate report. This report serves two main purposes: to outline the catalogue of the necessary requirements for risk mapping and disaster loss data management, and to give an overview of risk management and the disaster loss methodology in Ireland, Sweden and the Netherlands.

> ***This report covers only Outcomes 2 and 3*** *– risk management and disaster loss methodology in Estonia. Separate report is issued for Outcome 1.*

1.1.2 Scope of the Project Outcomes 2 and 3

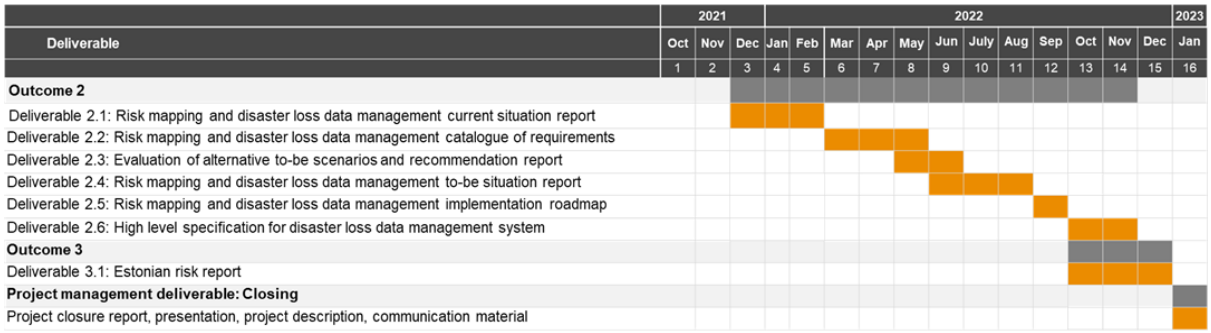
The scope of the Project Outcomes 2 and 3 has two focuses. The first focus is on the **crisis management activities of the local municipalities.** This involves activities in three stages: preparing for the crisis (creating risk awareness, assess risks, design prevention and resilience policies), activities during crisis and activities after the crisis. The second focus is on the **disaster loss data management at the state authority level** – what (if anything) has been done so far in relation to the disaster loss quantification and assessment, what are the best use cases for the disaster loss data and what is (or should be) the methodology behind the calculations.

1.2 Methodology and Approach

In order to deliver the catalogue of requirements, some activities were already done during the Deliverable 2.1, such as having interviews with all stakeholders and looking to the current main constraints. During this Deliverable, additional interviews and co-creation workshops with the main stakeholders were also held. Weekly co-creation and review sessions with the Beneficiary were also being held every Friday. These sessions included exchanging and validating the information obtained to date.

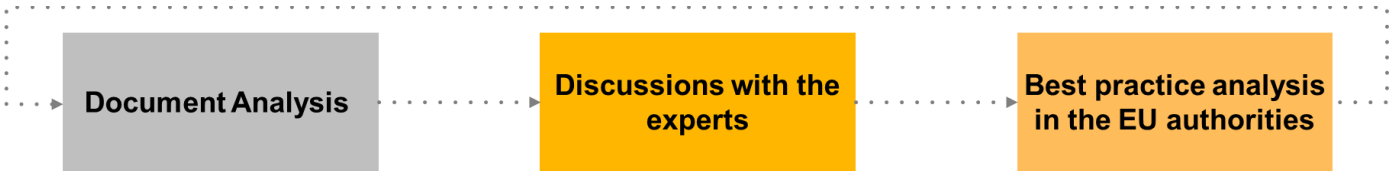
Figure 1 gives a high-level overview of the Project activities and timeline. The activities of the Deliverable 2.2 took place from March 2022 to May 2022.

Figure 1. Project activities and timeline



Three different methods were used and combined to map the foreign risk mapping and disaster loss data management processes (see Figure 2).

Figure 2. Methods used to map the risk mapping and disaster loss data management process



The methods used for the international practice analysis included mapping out the right EU countries and authorities that have the best practices in both risk mapping and disaster loss data management process, and subsequently contacting and interviewing representatives of these countries. In-depth analysis was carried out in these countries as well as case studies based on publicly available information, and PwC and OECD insights. The selection of countries was done in co-operation with both the Beneficiary and OECD.

Several discussions/interviews with the experts from the foreign countries were held. The focus of these interviews was to understand different methodologies and overall practices used in these countries.

Document analysis included the analysis of publicly available resources and documents mapped during the interviews and collected from the ministries/authorities/local municipalities after the interviews. Documents and various analysed sources are provided in footnotes throughout the report.

1.3 Limitations

The main limitations come from the current geopolitical situation in Ukraine – the situation has made it difficult to get in contact with some of the higher-level foreign practice contacts. Due to this, the active experience sharing virtual meetings between the Beneficiary and the identified authorities will take place in May. The situation also has made it difficult to engage all relevant stakeholders in co-creation workshops in Estonia to validate the catalogue of requirements due to the unavailability of the participants.

As the ultimate users of the disaster loss methodology are not yet finally defined in Estonia, the requirements could not be validated with anyone else than the Beneficiary. The mapping of the requirements was done based on the common foreign practices approach – the disaster loss estimation is not a standalone activity, and it forms an inherent part of the impact assessment within the risk assessment framework.

2 Crisis management practice analysis in other countries

2.1 Methodology for the country selection and analysis

In this chapter we will provide an overview of the results of the international practice exchange with the three EU authorities. As the current approach to Outcome 2 aims to improve the Estonian crisis management system, this overview focuses on the national crisis management build-up system in the three EU countries and draws recommendations from the organisation model and methodologies used for crisis management (including risk assessment tools, data usage, roles, and responsibilities).

The initial input regarding the examples of good practices was collected during the interviews with the Estonian crisis management practitioners already during the Outcome 2.1. Furthermore, we discussed the Beneficiary's expectations from the best practice review and the countries they themselves consider to be the great examples. The final selection of countries was in close co-operation with the Beneficiary. Moreover, we discussed the previous experiences of the Beneficiary to eliminate the countries which are not open to share their practices or which do not have any publicly available resources regarding crisis management.

Once the initial sample of countries was formulated, the sample selection was also validated with the representatives from OECD. The OECD gave feedback to our country selection by highlighting the potential difficulties in getting the relevant and comparable information for the Estonian approach. Moreover, the OECD shares initial indications to determine which countries should have information available publicly.

While selecting the countries to focus on, the following criteria were kept in mind:

1. **Context of the country is comparable with Estonia** – the countries should be similar to Estonia in size, overall climate and terrain. The risk events the selected country focuses on should be applicable for Estonia as well.
2. **Administrative system used in the country is comparable to Estonia** – this means that if the country has a federal system where all the states can have their own approach to crisis management, it may not be useful. Moreover, as our approach focuses on the role of Local Municipality Government, the municipalities in the selected country should also have relevant responsibility in crisis management.
3. **The country has clearly established crisis management policies,** procedures, roles, and responsibilities among the stakeholders. The system used in these countries is seen as a flagship and recognised by the stakeholders (OECD, the Beneficiary as well as other Estonian authorities).
4. **2021 DESI (**Digital Economy and Society Index) **results**.
5. **OECD validation –** OECD approves the selected country as a good example of crisis management policy.

After consulting with the Beneficiary and OECD experts, we decided to focus on the three countries: Sweden, Ireland and the Netherlands. Comparison of the selected countries can be found in Table 1.

The in-depth analysis of the practice was conducted in two parts:

- a general overview of the selected country;
- specific analysis of the selected area/ institution/ solution. Within this analysis the focus was on the key perspectives which are also important for the development of the Catalogue of requirements.

The following sources were used: (1) information from the public sources (research reports, databases); (2) information provided by OECD experts; (3) information gathered using PwC network (experts in all EU countries), (4) information from the local officials.

Table 1. Comparison of the selected countries

	Estonia	Sweden	Ireland	The Netherlands
DESI overall result	7	3	5	4
Population	1,328,976[24]	10,327,589[17]	4,964,440[18]	17,407,585 [19]
Number of the local municipalities	79 [20]	290 [21]	31 [22]	355 [23]
GDP per capita (EUR)	20,324[24]	45,387[17]	70,373[18]	44,858[19]
Size (km²)	45,336[24]	447,424 [17]	69,947[18]	37,378[19]
Main responsibilities of the local municipalities[25]	• Education • Social welfare • Health services • Culture, leisure and sports • Social housing • Urban and rural planning • Tourism • Public transport • Water supply, sewage, public lighting and central heating • Environment • Waste collection and disposal	• Social services • Childcare and preschool • Primary and secondary education • Care for the elderly • Support for the physically and intellectually disabled • Primary healthcare • Environmental protection • Spatial planning • Refuse collection and waste disposal	• Road construction and maintenance • Housing • Leisure facilities • Urban planning	• Urban planning • Housing • Tourism • Civil engineering • Transport • Health • Primary education • Employment • Childcare • Social services • Law and order • Culture and sports

[17] European Commission, "Statistical Factsheet: Sweden," published June 2021, https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/agri-statistical-factsheet-se_en.pdf

[18] European Commission, "Statistical Factsheet: Ireland," published June 2021, https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/agri-statistical-factsheet-ie_en.pdf

[19] European Commission, "Statistical Factsheet: Netherlands," published June 2021, https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/agri-statistical-factsheet-nl_en.pdf

[20] European Committee of the Regions, "Estonia," accessed April 28, 2022, https://portal.cor.europa.eu/divisionpowers/Pages/Estonia-Introduction.aspx

[21] Government Offices of Sweden, "Municipalities and regions," accessed April 28, 2022, https://www.government.se/government-policy/municipalities-and-regions/#:~:text=At%20the%20local%20level%2C%20Sweden,takes%20decisions%20on%20municipal%20matters.

[22] LGMA, "Local government," accessed April 28, 2022, https://www.lgma.ie/en/irish-local-government/#:~:text=The%20elected%20council%20is%20the,services%3B%20libraries%20and%20fire%20services.

[23] Chuka Nwanazia,"Gemeentes: what are Dutch municipalities and how do they work?" Dutchreview, published July 29, 2021, https://dutchreview.com/expat/municipalities-in-the-netherlands/#:~:text=On%20January%201%2C%202020%2C%20the,of%20the%20political%20governance%20structure.

[24] European Commission, "Statistical Factsheet: Estonia," published June 2021, https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/agri-statistical-factsheet-ee_en.pdf

[25] CEMR, "Local and regional government in Europe: Structures and competences," accessed April 28, 2022, https://www.ccre.org/docs/Local_and_Regional_Government_in_Europe.EN.pdf

	Estonia	Sweden	Ireland	The Netherlands
	• Road and cemetery maintenance • Local taxes	• Rescue and emergency services • Water supply and sewerage • Road maintenance		

2.2 Country 1 – Sweden

Table 2. Abbreviation - Sweden

Term	Definition
IBERO	Instrument for preparedness evaluation of area responsibility
IDA	Indicator, data, analysis
MSB	Swedish Civil Contingencies Agency
MVA	Multidimensional activity analysis
RIB	Integrated decision support for protection against disasters
ROSA	Risk and vulnerability analysis

2.2.1 General overview of Sweden in the context of crisis management and disaster loss methodology

2.2.1.1 General institutional set-up of local governments and their governance

Sweden has three levels of government: national government, regional government and local government. Sweden is divided into 21 counties (regions) and 290 municipalities. [26]

The municipalities have the overall responsibility for local affairs, but they have been assigned extended responsibilities for the law and overall responsibility for local affairs. These responsibilities involve social protection (care for the family, child, elderly and disabled), education (preschool, primary and secondary education), vocational training, planning and building issues, healthcare (prevention), environmental protection, utilities (waste, water and sewerage), local roads and public transport, leisure and culture, housing, rescue services, etc.[27] Thus, the responsibilities of the Swedish local municipalities are very similar to the Estonian local municipalities.

County councils' responsibilities include healthcare (primary care, hospitals, ambulatory care, dental care, medical services) and regional public transport. Some county councils are also responsible for the regional development.[28]

Each municipality has an elected assembly and the municipal council that makes decisions on municipal matters. The municipal council appoints the municipal executive board that leads and co-ordinates the municipality's work.[29]

[26] OECD, "Sweden," published October 2016, https://www.oecd.org/regional/regional-policy/profile-Sweden.pdf
[27] OECD, "Sweden," published October 2016, https://www.oecd.org/regional/regional-policy/profile-Sweden.pdf
[28] OECD, "Sweden," published October 2016, https://www.oecd.org/regional/regional-policy/profile-Sweden.pdf
[29] Government Offices of Sweden, "The Swedish model of government administration," accessed April 28, 2022, https://www.government.se/how-sweden-is-governed/the-swedish-model-of-government-administration/

2.2.1.2 Swedish approach to security and crisis management

The Swedish system for the disaster management is based on an **all-hazards approach**. [30] The all-hazards approach is often used when the probabilities of different threats are difficult to determine – thus, all probable threats are taken into consideration. The all-hazards approach is designed to respond to threats that impact the civil society's safety, economic growth, environment and territorial security. [31]An all-hazards approach is an integrated approach to the emergency preparedness planning that focuses on the capacities and capabilities that are critical to preparedness. This approach is specific to the location of the provider or supplier and considers the particular type of hazards most likely to occur in their areas.[32]

The Swedish Civil Contingencies Agency (MSB) facilitates co-ordination of measures for prevention, preparedness and response across sectors and levels of government. Key terms and concepts used in the Swedish crisis management system can be found in Table 3.

Table 3. Definitions of risk and crisis management terms in Sweden[33]

Term	Definition
Exceptional event	an event that deviates from the norm, entails serious disruptions or impending risks of serious disruptions of critical societal functions and that requires prompt responses.
Capability	the robustness and capacity that is needed to avoid and deal with the serious emergencies. This emergency preparedness capability is divided into crisis management capability and the capability in critical societal functions to resist serious disruptions.
Crisis management capability	an organisation's capability in times of serious disruptions to lead its own operations, to make decisions within its area of operations or responsibility, to quickly distribute correct and reliable information and, when necessary, to be able to co-ordinate with other parties and their actions.
Operative capability	the capability that entities deployed 'in the field' need to initiate and conduct the measures required to assist, protect, and lessen the effects that has occurred as quickly as possible.
The capability in critical societal functions to resist serious disruptions	the capability needed for the operations to be conducted at such level that society, despite a serious disruption, can still function and ensure fundamental service, security and care.
Threat	an entity's capacity and intention to conduct destructive actions. It is sometimes referred to as a threat assessment. A threat can even consist of an event or phenomenon that produces a danger to something or someone without the presence of entities with the capacity and intention to cause damage in the context.
Risk	a weighing of the probability that an event will occur and the (negative) consequences that this event can produce. In relation to threats, a risk is seen as a more concrete effect of various occurrences. Climatic changes

[30] European Commission, "The national disaster management system: Sweden," last modified August 24, 2021, https://ec.europa.eu/echo/what/civil-protection/national-disaster-management-system/sweden_it#:~:text=The%20Swedish%20system%20for%20disaster,sectors%20and%20levels%20of%20government.

[31] Elvira Kaneberg, "Emergency preparedness management and civil defence in Sweden: An all-hazards approach for developed countries´ supply chains," JIBS Dissertation Series no. 121, 2018, https://www.diva-portal.org/smash/get/diva2:1206379/FULLTEXT01.pdf

[32] CMS, "Frequently Asked Questions (FAQs): Clarifications on Definitions," published January 2017, https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertEmergPrep/Downloads/FAQ-Round-Four-Definitions.pdf

[33] European Commission, "The national disaster management system: Sweden," last modified August 24, 2021, https://ec.europa.eu/echo/what/civil-protection/national-disaster-management-system/sweden_en

(threat) can, for example, entail an increased probability and greater consequences of widespread flooding (risk).

The crisis and emergency management system is based on three principles: [34]

- **The principle of responsibility** – that means that actors retain their ordinary responsibilities in situations of crisis and disaster. This principle also includes a responsibility to support other parties involved, if necessary.
- **The principle of proximity** – that means that crises and disasters should be managed as close as possible to those primarily concerned. The geographical responsibility to manage an event lies with those parties most directly affected. The rescue services are organised at local level.
- **The principle of similarity** – that means that the methods and structures used in crisis and disaster management should be as similar as possible to those used in normal circumstances.

As mentioned before, Sweden has three levels of government and the responsibility for crisis and disaster management also lies at national, regional, and local levels. However, some of the tasks and responsibilities differ from one level to another.

Table 4 gives an overview of what responsibilities different government levels have regarding crisis management:

Table 4. Responsibilities in Sweden [35]

Central	Regional	Local
At national level, Swedish civil protection operates on the principle of responsibility. **All agencies and departments are responsible for the maintaining activity during emergencies**. **The central government is responsible for**: • strategic matters as well as support to regional and local authorities; • Civil Emergency Planning; • Crisis Management Co-ordination. **The Swedish Civil Contingencies Agency is responsible for:** • management and co-ordination of national operational measures within and between all levels of governance; • preventive efforts, response and recovery during and after a crisis or an accident.	**County Administrative Boards are responsible for:** • co-ordination of tasks in the field of protection against accidents, emergency preparedness and civil defence; • regional risk and vulnerability assessments; • support of other actors, especially the municipalities, in their planning, risk and vulnerability assessments, training and exercises.	According to the Swedish proximity principle, emergencies should be handled at the lowest possible level in society in the first instance. **Municipal authorities are responsible for:** • risk and vulnerability assessments; • co-operation with the county administrative boards; • organisation of the regular trainings and exercises for politicians and officials (together with the county councils).

The municipality must conduct an external monitoring in order to be able to identify and prevent the emergency events at an early stage. The municipality should appoint an Officer in

[34] European Commission, "The national disaster management system: Sweden," last modified August 24, 2021, https://ec.europa.eu/echo/what/civil-protection/national-disaster-management-system/sweden_en

[35] European Committee of the Regions, "Sweden – Civil Protection," accessed April 28, 2022, https://portal.cor.europa.eu/divisionpowers/Pages/Sweden-Civil-protection.aspx

Emergency Preparedness (OEP) who will be always on standby. OEP's role is to initiate and co-ordinate the initial work to detect, verify, alert and inform in case of emergency events. [36]

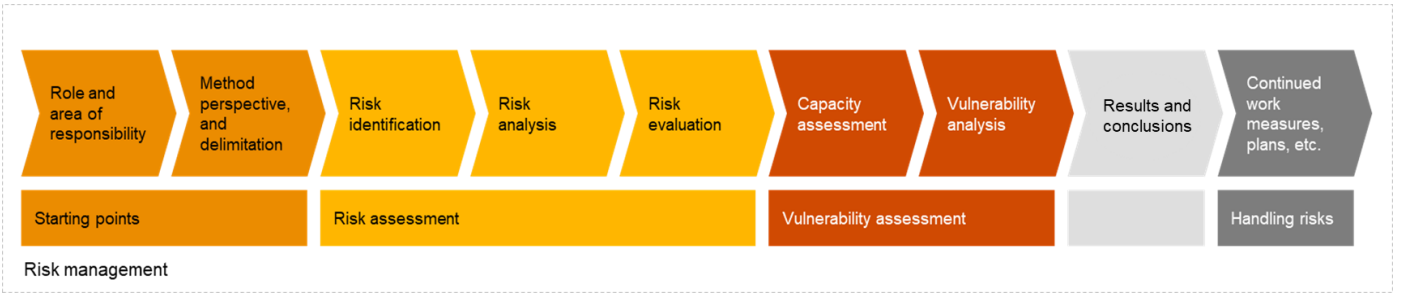
The crisis management activities carried out by municipalities can be compensated by the MSB. The compensations are assigned annually by the government. If a municipality has not fulfilled its tasks, the County Administrative Board may propose that a part of the compensation should be reduced. The MSB will make the final decision of whether that should be done or not. [37]

The compensation that the regions receive for municipalities is determined and paid by the National Board of Health and Welfare, for activities within the National Board of Health and Welfare's area of responsibility. For other activities, the MSB decides on the compensation and pays it within the framework of what the government decides.[38]

2.2.1.2.1 Risk and vulnerability analysis

According to the Emergency Preparedness Ordinance[39], all state agencies must conduct a **risk and vulnerability analysis**. Municipalities and county councils have the same obligation according to the Act on Municipal and County Council Measures prior to and in the event of emergency incidents and during high alert.[40] The risk and vulnerability analysis is an important part of the overall risk management process in Sweden, as can be seen in Figure 3.

Figure 3. Risk management process in Sweden



The purpose of risk and vulnerability analysis work is to **increase the awareness and knowledge** of decision-makers and those in charge of operations of the threats, risks and vulnerabilities within their areas of operations, as well as to **create an informed basis for planning**.

Risk and vulnerability analyses provide an important knowledge of how to prevent, prepare for and manage crises. In summary, the purposes of the risk and vulnerability analyses are the following: [41]

- to provide a basis for decisions to decision-makers and those in charge of operations;

[36] MSB, "Myndigheten för samhällsskydd och beredskaps föreskrifter om kommuners risk- och sårbarhetsanalyser," published February 5, 2015, https://www.msb.se/siteassets/dokument/regler/rs/15e78831-767b-4714-9fa4-3b4fd0df92a8.pdf

[37] Justitiedepartementet L4, "Förordning (2006:637) om kommuners och regioners åtgärder inför och vid extraordinära händelser i fredstid och höjd beredskap," accessed April 28, 2022, https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/forordning-2006637-om-kommuners-och-landstings_sfs-2006-637#:~:text=enligt%205%20kap.-,1%20%C2%A7%20lagen%20(2006%3A544)%20om%20kommuners%20och%20regioners,ramen%20f%C3%B6r%20vad%20regeringen%20beslutar

[38] Justitiedepartementet L4, "Förordning (2006:637) om kommuners och regioners åtgärder inför och vid extraordinära händelser i fredstid och höjd beredskap," accessed April 28, 2022, https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/forordning-2006637-om-kommuners-och-landstings_sfs-2006-637#:~:text=enligt%205%20kap.-,1%20%C2%A7%20lagen%20(2006%3A544)%20om%20kommuners%20och%20regioners,ramen%20f%C3%B6r%20vad%20regeringen%20beslutar

[39] Justitiedepartementet L4, "Förordning (2015:1052) om krisberedskap och bevakningsansvariga myndigheters åtgärder vid höjd beredskap," accessed April 28, 2022, https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/forordning-20151052-om-krisberedskap-och_sfs-2015-1052

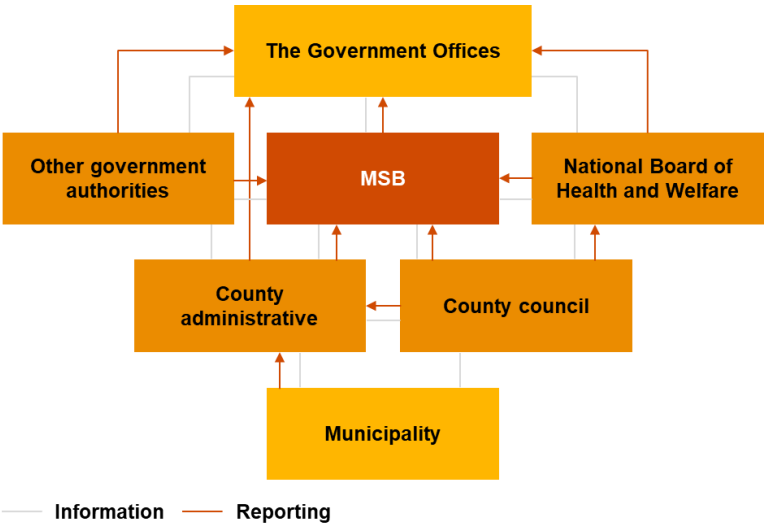
[40] MSB, "Guide to Risk and vulnerability analyses," published March 2012, https://rib.msb.se/filer/pdf/26267.pdf

[41] Elvira Kaneberg, "Emergency preparedness management and civil defence in Sweden: An all-hazards approach for developed countries´ supply chains," JIBS Dissertation Series no. 121, 2018, https://www.diva-portal.org/smash/get/diva2:1206379/FULLTEXT01.pdf

- to provide the public with an informational basis of society's risks;
- to provide the basic data for community planning;
- to contribute to providing a risk profile for all of society.

Figure 4 illustrates a comprehensive view of all stakeholders, who contribute to society's collective ability to identify, analyse, and evaluate risks and vulnerabilities. In connection with conducting the risk and vulnerability analyses, the exchange of information should occur in two directions. **Each individual organisation both contributes to increasing the shared knowledge by sharing information and data as well as gathers data and information from the other organisations.**

Figure 4. Information exchange in Sweden



2.2.1.3 Role of regions and municipalities

A county administrative board should conduct a regional risk and vulnerability analysis in co-operation with the municipalities, the county council, government authorities and private actors in the county. All municipalities and the county council report their overall county risk and vulnerability analysis to the county administrative board, and since **the entire county is working with the same scenarios**, the municipal risk and vulnerability analyses create the basis for the overall regional analysis. [42]

The municipality's work with risk and vulnerability analysis can be co-ordinated and integrated with the risk analysis work that takes place in accordance with other legislation, such as the Safety Protection Act and the Accident Protection Act.[43] A municipality must compile and report the results of the analysis to the county administrative board no later than 31 October during the first calendar year after the ordinary election to the municipal council. The next reporting will take place in 2023.[44] The municipalities' **risk and vulnerability analyses are not public** as they could create unnecessary tension among the population of the municipality or be a good source of information for potential terrorist activities.

[42] Elvira Kaneberg, "Emergency preparedness management and civil defence in Sweden: An all-hazards approach for developed countries´ supply chains," JIBS Dissertation Series no. 121, 2018, https://www.diva-portal.org/smash/get/diva2:1206379/FULLTEXT01.pdf

[43] Justitiedepartementet L4, "Förordning (2006:637) om kommuners och regioners åtgärder inför och vid extraordinära händelser i fredstid och höjd beredskap," accessed April 28, 2022, https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/forordning-2006637-om-kommuners-och-landstings_sfs-2006-637#:~:text=enligt%205%20kap.-,1%20%C2%A7%20lagen%20(2006:544)%20om%20kommuners%20och%20regioners,ramen%20f%C3%B6r%20vad%20regeringen%20beslutar

[44] MSB, "Myndigheten för samhällsskydd och beredskaps föreskrifter om kommuners risk- och sårbarhetsanalyser," published February 5, 2015, https://www.msb.se/contentassets/24ed4fb87fa9462fbc2dd1a12811fbd9/foreskrifter-kommuner-rsa.pdf

The local municipality's tasks for assembling the risk and vulnerability analyses are the following:

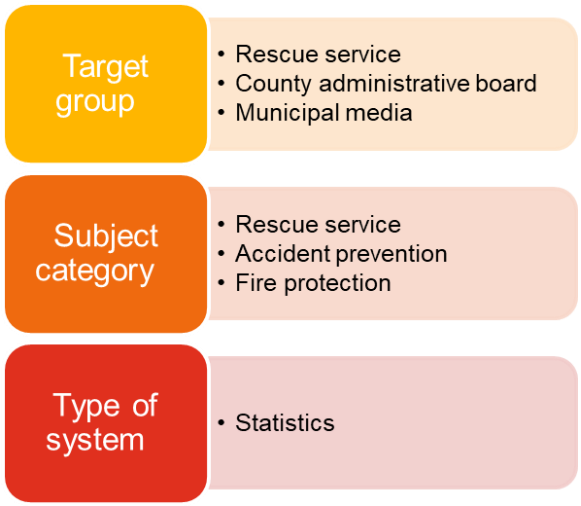
- The municipality shall conduct the work with risk and vulnerability analysis that pertains to the geographical area responsibility, the municipality's organisation as well as the relevant municipal companies and municipal associations.
- The municipality shall use the information from the risk and vulnerability analysis in the planning and implementation of measures to increase the ability to continuously conduct socially important activities as well as strengthen the ability to handle the emergency events.
- After a crisis has occurred, the municipality must evaluate the municipality's management, both in terms of the municipality's operational responsibility and the geographical area responsibility. The data must be used in the work with subsequent risk and vulnerability analysis.

2.2.1.4 Disaster loss[45]

Disaster loss accounting is not a part of the crisis management activities carried out by the MSB or other Swedish authorities. However, in order to learn from the previous incidents, the natural disaster database collates information about natural disasters in Sweden (hereinafter referred to as IDA). IDA is a statistics and analysis tool where the information regarding the accidents and incidents as well as individuals' perceptions of safety and security may be downloaded (Figure 5 points out the target groups and subjects where IDA is mainly used). The database offers municipalities and other agencies and organisations assistance and support during the physical planning and planning for effective emergency response operations.

IDA is run by the MSB, but it is dependent upon the other agencies' incident reports. The municipal rescue services document their efforts and assignments in the incident reports (approximately 100,000 per year). The MSB has been collecting data from these reports since 1996 and uses them for statistics and analyses, which are published primarily in statistics and analysis tool IDA. Since 1 January 2022, MSB regulations on investigation reports apply after municipal rescue efforts. The information from the incident report must be submitted no later than two months after the rescue operation has ended.

Figure 5. Usage of IDA



[45] MSB, "The MSB's work related to natural disasters," accessed April 28, 2022, https://www.msb.se/siteassets/dokument/publikationer/english-publications/the-msbs-work-related-to-natural-disasters.pdf

2.2.2 Methodologies applied

2.2.2.1 Vulnerabilities assessment approach for local authorities

The municipality's risk and vulnerability analysis must be in accordance with the following aspects: [46]

- description of the municipality and its geographical area;
- description of the work process and method;
- identified socially important activities within the municipality's geographical area;
- identified critical dependencies for the municipality's socially important activities;
- identified and analysed risks for the municipality and its geographical area;
- description of the identified vulnerabilities and shortcomings in crisis preparedness within the municipality and its geographical area;
- need for measures due to the results of the risk and vulnerability analysis.

The risk and vulnerability analysis will be used as a basis for planning and deciding on measures to reduce the vulnerability of the business and/or strengthen the municipality's crisis management capacity in:

- affected activities;
- municipally owned companies;
- municipal associations.

The risk and vulnerability report should be divided into two parts:[47]

- risk identification;
- risk analysis.

Risk identification aims to identify the emergency events and conditions within the municipality's own operations and the geographical area that pose a threat or a risk. The result of the risk identification should be an overview of sources of risk or roughly described risk scenarios.

Risk analysis should be based on the identified risks or a selection of them. The identified risks should be developed into more detailed risk scenarios. The risk analysis should include an assessment of how likely the scenario is to occur and what direct consequences it entails. In cases where the probability assessment is associated with the excessive uncertainty, the assessment can be omitted. The starting point for the impact assessment should be the life and health of the population, the functionality of society, and fundamental values, such as the rule of law and democracy as well as damage to property and the environment. In the impact assessment initial conclusions about vulnerabilities and shortcomings in ability, which are then summarised together with other conclusions, can be drawn.

Another component of the risk analysis is assessing the capacity to prevent the occurrence of the risk scenario as well as evaluating the capacity to deal with the consequences. A vulnerability exists when there is a lack of the capacity to prevent a risk scenario or to deal with its consequences. **Identifying these vulnerabilities and determining measures to address them** (e.g. buying more electricity generators**) is the primary purpose of risk assessment**. In other words, a **risk assessment is successful if it results in vulnerabilities being identified and assembles plans to address the vulnerabilities that would not otherwise havebeen identified**.

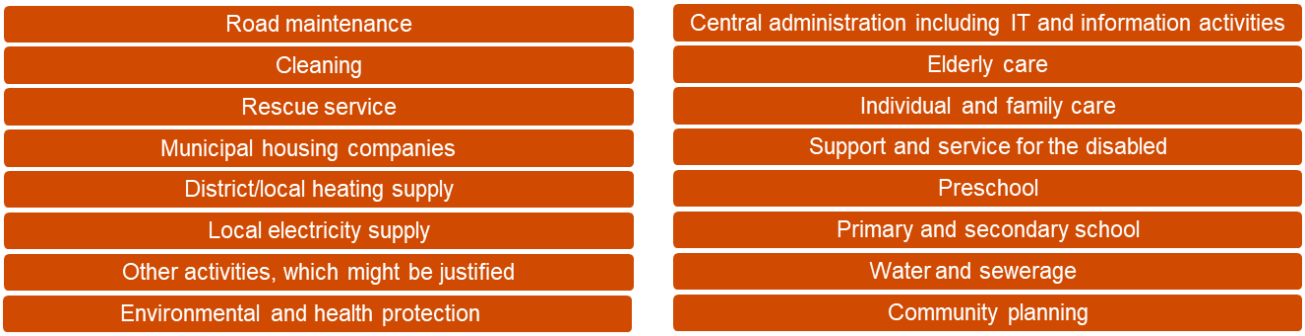
[46] MSB, "Myndigheten för samhällsskydd och beredskaps föreskrifter om kommuners risk- och sårbarhetsanalyser," published February 5, 2015, https://www.msb.se/siteassets/dokument/regler/rs/15e78831-767b-4714-9fa4-3b4fd0df92a8.pdf

[47] MSB, "Myndigheten för samhällsskydd och beredskaps föreskrifter om kommuners risk- och sårbarhetsanalyser," published February 5, 2015, https://www.msb.se/siteassets/dokument/regler/rs/15e78831-767b-4714-9fa4-3b4fd0df92a8.pdf

The report of the risk and vulnerability analysis must be acknowledged by the decision-makers, employees within the municipality (relevant administrations or equivalent, companies and municipal associations) and other relevant stakeholders in the geographical area. [46]

The stakeholders and/or (private) municipality operating companies mentioned in Figure 6 **must be involved** in the risk and vulnerability analyses (regardless of whether they are conducted in the form of administration, company, municipal association, joint committee or procured).

Figure 6. Stakeholders involved in Swedish risk and vulnerability analyses



As a part of their risk and vulnerability assessment, the local authorities are required to **analyse their material and human resources that are particularly critical for dealing with emergency events.** The municipality must annually update its documentation of internal material and personnel resources that are available during an emergency event (e.g., mobile reserve power equipment or flood protection assets). Additionally, there must be the routine maintenance and functionality checks of the material resources. If necessary, agreements must be in place with the external stakeholders on the reinforcement resources and procedures for requesting and receiving reinforcement resources (material and personnel) from the external stakeholders (local/regional/national/international) should be established.

The premises of the crisis management organisation locations must be equipped with:

- electricity supply, with the possibility of reserve power supply for premises, workplaces and technical systems with a duration of at least one week;
- IT networks;
- technical systems for communication and overall situation;
- access to water for handling food and drink, and for hygiene that allows endurance in at least a week.

These locations must be regularly tested and the municipality should designate an alternative location for the crisis management organisation locations.[48]

There are also general guidelines from the MSB. **General advice is not mandatory.** The function of the guidelines is to clarify the meaning of laws, ordinances or government regulations and to give general recommendations on their application.

2.2.2.2 Methodologies used for the vulnerability assessment

Risk and vulnerability analyses can be both quantitative and qualitative. Swedish local municipalities can choose from the numerous supporting methodologies to facilitate their risk and vulnerability analysis. These methods allow analysing risks and vulnerabilities in relation to an activity, a geographic area or in a wider system. Different tools and methods fall into three main categories: seminar-based scenario methods, traditional risk analysis methods and other methods. [49]

[48] MSB, “Myndigheten för samhällsskydd och beredskaps föreskrifter om kommuners risk- och sårbarhetsanalyser,“ published February 5, 2015, https://www.msb.se/siteassets/dokument/regler/rs/15e78831-767b-4714-9fa4-3b4fd0df92a8.pdf

[49] MSB, “Guide to Risk and vulnerability analyses,“ published March 2012, https://rib.msb.se/filer/pdf/26267.pdf

Scenario methods[50]

Scenario methods (Figure 7) study one or more risk scenarios that could occur in the future. The results of the risk analysis provide a good description of different risk scenarios. The seminar-based scenario methods start from the group discussions around a defined risk scenario that is frequently used for the risk and vulnerability analyses. Some of the commonly occurring methods are Multidimensional activity analysis (MVA), Instrument for preparedness evaluation of area responsibility (IBERO), and Risk and vulnerability analysis (ROSA).

Figure 7. Constructing a scenario

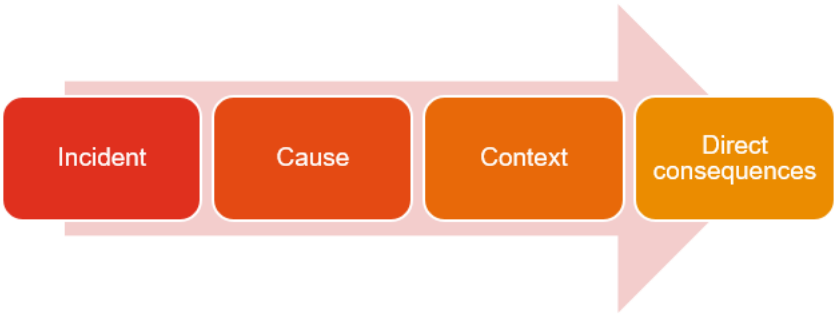


Table 5. Scenario methods[51]

	MVA	IBERO	ROSA
Definition	Multidimensional activity analysis	Instrument for preparedness evaluation of area responsibility	Risk and vulnerability analysis
Description	The MVA is a scenario-based method and starts with a group of people gathering to discuss different risk scenarios that could occur in the activities of the actors. The work is divided into three different seminars: Platform (inventory of values, functions and objects worth preserving; risk probability/impact assessment), Analysis (vulnerability assessment of a selected scenario) and Feedback (improvement areas and measures taken). The purpose of the method is to analyse the vulnerabilities and capabilities of organisations and activities from a broad perspective, to develop measure proposals and to create conditions for good exchange of knowledge and personal networks.	IBERO has the character of a tool rather than a method but contains the various parts that are important in analysis work. The tool is adapted for the individual actors, municipalities, county councils, county administrative boards and authorities in their work on risk and vulnerability analyses. The tool is scenario-based and supports the stakeholders with the area responsibilities in their work on analysing the ability to withstand and manage undesirable incidents as well as review the consequences of the incidents. The tool is IT-based and can store a large amount of information from the various actors. It also supports communication between the stakeholders. The analysis tool contains	ROSA is a vulnerability-oriented method. It starts from the hypothesis that it is not possible to identify in advance all the thousands of threats and risks that actors are vulnerable to. Active analysis work, however, must be able to cover a large part of the threats and risks that could be expected to arise. ROSA starts from scenarios that support the group in assessing the actor's ability to manage hardships. A visual depiction about the seven-step ROSA method can be found in Appendix 7.

[50] MSB, "Guide to Risk and vulnerability analyses," published March 2012, https://rib.msb.se/filer/pdf/26267.pdf
[51] MSB, "Guide to Risk and vulnerability analyses," published March 2012, https://rib.msb.se/filer/pdf/26267.pdf

	Generally, it describes how the work on a risk and vulnerability analysis should be designed, but it also emphasises that the working process is an important part of the result.	four functions that are shown in Appendix 11.	

Traditional risk analysis methods[52]

Everything used to analyse technical systems, which are also called system-based methods, are included from the traditional risk analysis methods. The difference between scenario-based methods and traditional risk analyses is that the latter focuses more on describing the system and its functions before the analysis is conducted. The analysis methods are Broad Analysis, Fault Tree Analysis and the 'What-if' method.

Table 6. Traditional risk analysis methods

	Broad Analysis	Fault Tree Analysis	''What-if' Analysis
Description	Broad Analysis is a qualitative method used to map risks in a system and identify risk scenarios. It is often called preliminary risk analysis, since it is often used in the initial phase and it does not provide a complete picture of the system risks, nor describe any vulnerabilities or the ability to handle them. A Broad Analysis is preferably carried out by a working group that has knowledge of both the method and the system to be analysed. Identifying risks, causes and assessing consequences is based on the experiences and creative thinking of the working group, and any possible checklists. The analysis work itself starts with a brainstorming that can be supplemented with a systematic approach, e.g. checklists. When the risks are identified, all of them are analysed through a description of the course of the incident (possible cause, consequences, probabilities). The consequence assessment is based on three categories: people, environment and property. A five-step scale is often used in the assessment of both consequences and probabilities, but the actors can establish their own	The method aims at identifying the reasons why incidents occur. The starting point is an undesirable incident, called a top event. Through a logical approach the incident is gradually broken down to the desired level of detail, so that the error that caused it is discovered. It also allows to see the connections between the different erroneous actions that led to the top event. The method is both qualitative and quantitative in character. A Fault Tree Analysis consists of three elements: fault tree construction, identifying which combinations of events caused the top event and an evaluation. In constructing the fault tree, the top event, and the erroneous actions and functions that could lie behind the cause of the top event are described. This takes place through the logic gates that have different contents. The gates show, among other things, whether the top event was caused by only one incident or several incidents in combination. The erroneous actions and erroneous functions identified are then broken down, so that it is possible to discern which	The purpose of the 'What-if' Analysis is to identify the potential undesirable incidents in a system and to investigate underlying causes as well as possible consequences. Initially, a structured brainstorming of what undesirable incidents could possibly occur in the system is carried out. The participants start from the question 'What happens if...?'. The questions are usually formulated starting from the previous experiences. When the undesirable incidents are identified, the causes of why they could happen are analysed. In addition, a consequence assessment is conducted. Sometimes a probability assessment of the undesirable incidents and their consequences is also conducted. Finally, the measures for decreasing the probability of undesirable incidents occurring or for reducing their consequences are proposed. The results are best presented in the fom a diagram or an outline that

[52] MSB, "Guide to Risk and vulnerability analyses," published March 2012, https://rib.msb.se/filer/pdf/26267.pdf

	Broad Analysis	Fault Tree Analysis	‘‘What-if’ Analysis
	classes for their activities according to what seems suitable. The last step in the analysis is proposing measures. The results report should be easily comprehensible, with the help of diagrams or a Broad Analysis outline. The outline of the Broad Analysis can be found in Appendix 9.	incidents cause them. In the next step, the incidents that started the chain reaction, called basic events, are identified. Specific combinations of incidents are then mapped. The evaluation of the fault tree takes place in the form of an assessment of the probability or frequency of the top event being calculated. Find an example of how the Fault Tree Analysis looks like in Appendix 8.	provides an easily understandable picture of the results.

Other methods[53]

Apart from the traditional methods above there are several others, such as Event Tree Analysis, Hazard and Operability Analysis (HAZOP), Management and Oversight Risk Tree (MORT), and Safety Management and Organisation Review Technique (SMORT). Beyond the established and traditional methods already presented, there are a few other methods, models and tools worth mentioning in the context, such as Dependency Analysis, Capacity Assessment, RIB, and Indicator, data, analysis (IDA).

Table 7. Other methods

	Dependency Analysis	IDA	RIB
Definition	Dependency Analysis	Indicator, data, analysis	Integrated decision support for protection against disasters
Description	The method aims to enable stakeholder to identify and analyse existing dependencies on other stakeholders. This is not a risk and vulnerability analysis, but it can be used to analyse the stakeholders’ dependency. The knowledge brought out in a Dependency Analysis provides a good foundation for such things as discussing how the stakeholders’ activities can be safer as well as improving plans and making them more in-depth prior to crises. The dependency analysis is divided into three steps: selection and description, identification and evaluation of external dependencies, and aggregate analysis. An	IDA is a web-based statistical database developed by the Swedish Rescue Services Agency and which is now provided free of charge by the MSB. It contains statistics on the information that the MSB collects and analyses. The statistics cover the entire country, and all counties and municipalities. The database is divided into three parts: indicator, data and analysis. The indicator portion contains data from national databases and provides the information on situation reports and comparisons between municipalities, counties and the nation.	RIB is primarily a toolbox and source of information for operational decision-makers who manage hazardous substances in various ways as part of their work. RIB is a link-up of several databases that provide the information on how a disaster can be managed, how preventive work can be planned, what risks a disaster that has occurred entails, what resources are available and where they are located. RIB contains things like the information on resources within the emergency services, businesses and authorities in the form of material, vehicles and experts that can be used. The resources can be searched

[53] MSB, “Guide to Risk and vulnerability analyses,“ published March 2012, https://rib.msb.se/filer/pdf/26267.pdf

	example can be found in Appendix 10.	The data portion provides users with the opportunity to create their own tables and diagrams based on MSB statistics plus links to other disaster databases (data on natural disasters, municipal crisis management, everyday safety). The analysis portion contains summaries, cost-benefit analyses, and evaluations of methods and working methods used by various actors.	by the municipality, region or throughout Sweden.

2.2.2.3 Disaster loss

The MSB, nor other Swedish authorities do not have the consistent processes in place for the post-event disaster loss accounting. However, disaster risks are modelled as a part of the risk evaluation consequence assessment. Consequences are assessed by the authorities carrying out the risk assessment. The specific authority and stakeholders involved depend on the scenario in question as well as the government level that is carrying out the assessment.

The reference objects for the consequence assessment should be the lives and health of the population, societal functionality, the basic values, and damage to property and environment. There is often a reason to have several different descriptions of the consequences due to a specific scenario. For example, the consequences of the number of people who are expected to perish owing to a scenario may be described at the same time by indicating how much economic damage the scenario creates. As with the probability of a certain scenario, the different methods for describing the consequences are divided into four groups[54]:

- **a qualitative description of the consequences** - uses qualitative descriptions of consequences without evaluating whether one scenario is more serious than another. These types of descriptions are difficult to use as a basis for planning since it may be difficult to compare different alternative measures;
- **a qualitative description with the help of a ranking scale** - qualitative description with the help of a ranking scale describing the consequences with the help of a qualitative ranking scale means establishing a scale that can be used to show how serious the different risk scenarios are in relation to each other (see Table 8);
- **a quantitative description with the help of a ranking scale and intervals** - consequences can also be expressed, so that it is easier for others to relate the assessment to their own analyses. This is done through the detailed descriptions of what is needed, so that the consequences of a scenario are described with the different classes, e.g. through giving the different classes a quantitative meaning. An example of a quantitative description with the help of a ranking scale regarding lives and health. It has five steps: (1) 'No deaths'; (2) '1 to 5 deaths'; (3) '6 to 20 deaths'; (4) '21 to 100 deaths'; and (5) 'over 100 deaths'. For most events, Sweden has not set out a predefined ranking scale;
- **a quantitative description** - the last group contains ways to describe the consequences quantitatively, e.g. as 'number of injured' or 'economic damage (MSEK)'. This way of expressing consequences can also contribute to the actor conducting the analysis being able to express uncertainty through the estimation with the help of an interval (Table 9).

Table 8. Consequences with the help of a qualitative ranking scale

Level	Consequences	Description

[54] MSB, "Guide to Risk and vulnerability analyses," published March 2012, https://rib.msb.se/filer/pdf/26267.pdf

1	Extremely limited	Small direct effects on health, extremely limited disruptions to societal functionality, transient mistrust towards individual social institutions, extremely limited damage to property and environment.
2	Limited	Moderate direct effects on health, limited disruptions to societal functionality, transient mistrust towards several social institutions, limited damage to property and environment.
3	Serious	Significant direct or moderate indirect effects on health, serious disruptions in societal functionality, continued mistrust towards several social institutions or changed behaviour, serious damage to property and environment.
4	Extremely serious	Extremely large direct or significant indirect effects on health, extremely serious disruptions to societal functionality, continued distrust towards several social institutions and changed behaviour, extremely serious damage to property and environment.
5	Catastrophic	Catastrophic direct or extremely large indirect effects on health, extreme disruptions in societal functionality, solid mistrust towards social institutions and general instability, catastrophic damage to property and environment.

Table 9. Illustration of the quantitative risk analysis

Risk analysis		
Scenario	**Frequency (per year)**	**Consequences**
Scenario 1	0.1	10 dead
Scenario 2	0.01	50 dead
Scenario 3	0.005	200 dead

2.2.3 Recommendations for the potential business needs

Methodologies. Sweden has described several methodologies and approaches for the local municipalities to conduct risk and vulnerability analysis. Many of the approaches and tools could be relevant for the Estonian local municipalities in making their risk analysis. For example, the **Fault Tree Analysis approach can be, among other areas, beneficial in understanding cross-dependencies between different services, functions or resources**. This methodology would help the municipalities to see the 'bigger picture' and pinpoint areas where the resilience to face a crisis is insufficient.

Stakeholder involvement is another good practice used in Sweden. Municipalities need to involve stakeholders and private companies to conduct the risk and vulnerability analyses. Having close contact with the local private companies is necessary in order to understand the extra risks the municipality might have as well as to find out the potential gaps for collaboration of the different stakeholders. When involving other important stakeholders (such as elderly care centres or the local electricity supply companies), the municipality is more likely to be prepared for the different issues which might occur within their area.

Annual mapping of material and human resources. The municipalities in Sweden review the resources they need for dealing with the situation as a part of the risk and vulnerability analysis. This analysis helps the municipality to adequately evaluate its preparedness and readiness to react. If other parties need to be involved, the relevant agreements also need to be made beforehand.

Similar risk analysis tasks, co-operation and information sharing between three levels of government. Every risk and vulnerability analysis produced by different actors within the crisis management system must be seen as a part of something greater. The analysis should be designed in such a way that other actors can also make use of them. To accomplish this goal, the background

of the analysis and delimitations made to the system (a system should be interpreted as if there were a number of elements that hang together and form a totality) need to be described. Consequently, all the actors can understand how the information from one analysis fits into another analysis. This approach allows to move towards greater data-driven decision-making. Using the same risk scenarios at all levels of government may help to notice blind spots in vulnerabilities or preparedness, because different parties are looking at the same data and combining data from various sources. This could also be motivational for the lower levels of government because they are able to see that the information they provided and analysis they have done is also used at higher levels.

2.3 Country 2 – Ireland

Table 10. Abbreviation - Ireland

Term	Definition
GIS	The Government Information Service
GTF	The Government Task Force on emergency planning
GTF Sub-Group	The Government Task Force SubGroup
LGD	The Lead Government Department
MEM	Major Emergency Management
NECG	The National Emergency Co-ordination Group
NSC	The National Security Committee
NSG	The National Steering Group on Major Emergency Management
OEP	Office of Emergency Planning
PRA	Principal Response Agencies

2.3.1 General overview of Ireland in the context of crisis management and disaster loss methodology

2.3.1.1 General institutional set-up of local governments and their governance

Ireland has 31 local authorities that are responsible for a range of local services, including housing, roads, recreation and amenities, planning, libraries, environmental protection, fire services, and register of electors.[55]

The Department[56] of Housing, Local Government and Heritage's **Local Government Division** is responsible for the oversight and governance in respect of local and regional government as well as resourcing – staffing and funding organisational, political, and structural effectiveness and modernisation. The Division also provides national leadership and co-ordination on fire, severe weather and emergency management through the dedicated National Directorate for Fire and Emergency Management. The Division has led the responsibility for co-ordination of the oversight and governance of the Departments State Agencies. [57]

2.3.1.2 Irish approach to security and crisis management

Ireland has two approaches to emergency management: vertical and horizontal emergency management systems. The vertical system establishes a policy for Regional and Local responders at the Operational and Tactical level. The policy is delivered through the National Directorate. The

[55] Citizens Information Board, "Local government," accessed April 28, 2022, https://www.citizensinformation.ie/en/government_in_ireland/national_government/local_and_regional_government/functions_of_local_authorities.html#:~:text=Most%20(26)%20local%20authorities%20are,represent%20them%20at%20local%20level

[56] Departments in Ireland are approximate equivalents of Ministries in Estonia.

[57] Government of Ireland, "Organisation information: Local Government Division," published January 3, 2020, https://www.gov.ie/en/organisation-information/d6993d-local-government-division/

horizontal approach establishes a cross-government[58] strategic level which sets out arrangements at national level delivered through the Office of Emergency Planning[59].

In 2005, Ireland developed The Framework for Major Emergency Management. The Framework is designed to fit with the 'all hazards' approach to emergency management and has been developed reflecting best international practice, customised to suit Irish conditions. The purpose of the Framework is to set out the common arrangements and structures for front-line public-sector emergency management in Ireland (see key terms used in the Irish crisis management system in Table 11). The objectives of the emergency management in Ireland are:

- to protect the public and minimise or prevent the damage to property, economy and critical infrastructure;
- to provide clear leadership in times of emergency, including arrangements for warning and informing the public;
- to facilitate timely and effective response through the efficient and co-ordinated operations;
- to ensure the maintenance of essential services and efficient and timely return to normal conditions;
- to foster and encourage resilience and community spirit, including supporting the provision of services by the voluntary emergency services and communities affected;
- to support the safe conduct of emergency response operations through the efficient planning, and realistic training and exercises;
- to co-ordinate the recovery phase of operations, thereby facilitating a timely return to normal life within the shortest practicable timescale.[60]

Table 11. Definitions of risk and crisis management terms in Ireland[61]

Term	Definition
Risk	The combination of the likelihood of a hazardous event and its potential impact.
Hazard	Any phenomenon with the potential to cause a direct harm to members of the community, the environment, the physical infrastructure or being potentially damaging to the economic and social infrastructure.
Impact	The consequences of a hazardous event actually happening, expressed in terms of a negative impact on human welfare, economic activity, environmental welfare or societal structures.
Likelihood	A probability or a frequency, whichever is appropriate for the analysis under consideration.
Risk Treatment	A process to modify risk (ISO 31000). Risk treatment processes that deal with negative consequences are referred to as 'Risk Mitigation'.
A Major Emergency	Any event which usually with little or no warning causes or threatens death or injury, or serious disruption of essential services, or damage to the property, environment or infrastructure beyond the normal capabilities of the principal emergency services in the area in which the event occurs and requires the activation of the specific additional procedures and the mobilisation of additional resources to ensure an effective, co-

[58] Government of Ireland, "About the National Directorate for Fire and Emergency Management" published on 23 December 2020, https://www.gov.ie/en/organisation-information/84e94-about-the-national-directorate-for-fire-and-emergency-management/

[59] Government of Ireland," Office of Emergency Planning" published on 31 October 2019, https://www.gov.ie/en/organisation-information/22afe3-office-of-emergency-planning/

[60] Government of Ireland "Strategic Emergency Management (SEM) National Structures and Framework" published on 12 October 2020, https://www.gov.ie/en/publication/7ff6f-strategic-emergency-management-sem-national-structures-and-framework/

[61] Department of Defence (Government of Ireland), "Strategic Emergency Management: National Structures and Framework," published October 2017, https://assets.gov.ie/90681/71eaf4b4-3c20-488d-b443-620e57a51c2b.pdf

ordinated response.[62] Strategic Emergency Management National Structures and Framework, a collection of 50 different events which could cause an emergency has been listed, including the Lead Government department, Principal support and remarks. This list can be found in Appendix 2.

Overall, the systems approach to Major Emergency Management (MEM) involves a continuous cycle of activity through five stages of emergency management (see Figure 8). One of the main purposes of the Framework for MEM is to set out the working relationship between the various elements which make up the front-line emergency response. The Framework provides the guidance for bodies/agencies which are involved in different aspects of emergency management on how they should interact with the Principal Response Agencies[63]. This is especially important to those who are required to prepare emergency plans.

Figure 8. Five-Stage Emergency Management Paradigm applied in Ireland

The Framework does not and is not intended to address the detailed response procedures of the relevant agencies in relation to specific incidents or hazards. However, it identifies where such procedures are required and it is expected that each of the agencies will review or develop its own procedures and arrangements on which the response of that agency will be built. Such procedures should be consistent with the provisions of the Framework.[64]

Since the mid-1980s the Principal Response Agencies have prepared Major Emergency Plans in accordance with a standard framework, which enable them to respond to incidents that fall within the definition of a Major Emergency. The process has been continuously updated to meet the requirements of Major Emergency Management set out in the Framework.

Each Principal Response Agency should prepare an individual Major Emergency Plan which sets out its arrangements to respond to events occurring in or impacting on its functional area which require the declaration of a Major Emergency. The updated Major Emergency Plan should be reviewed annually.

[62] Department of Housing, Local Government and Heritage (Government of Ireland),"A framework for major emergency management," accessed April 28, 2022, https://www.gov.ie/pdf/?file=https://assets.gov.ie/111468/28967024-3844-470c-b70c-c567f2ff372b.pdf#page=null

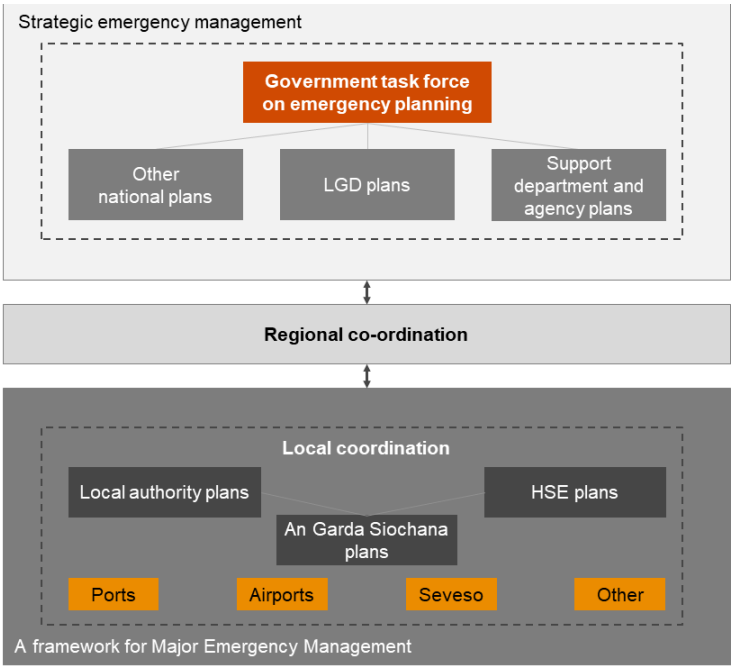
[63] Principal Response Agencies are functionally similar to the Estonian Responsible Authorities.

[64] Department of Housing, Local Government and Heritage (Government of Ireland),"A framework for major emergency management," accessed April 28, 2022, https://www.gov.ie/pdf/?file=https://assets.gov.ie/111468/28967024-3844-470c-b70c-c567f2ff372b.pdf#page=null

- Planning and Preparedness are the actions undertaken before an emergency occurs and include: preparation of emergency plans; development of preparedness and response arrangements as well as the building of capacity for assigned functions considering the risks faced; education, training and development of staff who will be required to respond to an emergency; exercising and testing of systems, plans and procedures; the procurement of resources necessary to underpin the preparedness; the maintenance of any necessary facilities; and the audit/assessment of preparedness.
- Response takes place immediately before, during and directly after an emergency and includes activities, such as public warning, search and rescue, emergency medical assistance, extinguishing of fires, containment of hazardous materials, transport of casualties, treatment of casualties, maintenance of public order and all associated support activities, as well as the co-ordination and management of these activities.
- Recovery is generally considered to take place in two phases - immediate recovery and long-term recovery. Immediate recovery activities include damage assessment, the clearing of debris, the restoration of essential supplies and services, and investigation. Long-term recovery activities include ongoing treatment and support of casualties and survivors, reconstruction of damaged infrastructure, buildings and services, restoring normality, and the identification of actions that may mitigate the effects of the future emergencies.
- Hazard Analysis/Risk Assessment is a process by which the hazards, facing a particular community, are identified and analysed/assessed in terms of the threat/risk which they pose.
- Mitigation/Risk Management includes all actions taken to eliminate or reduce the risk to people, property and the environment from the hazards which threaten them.

Overall, structures have been set up at national, regional and local level to support the development of the Framework (see Figure 9). The system used in Ireland has three layers: the strategic emergency management at national level which involves the government taskforce and lead agencies, a level of regional co-ordination and a level of local co-ordination. At local level planning is done by the local authorities as well as An Garda and the HSE. The plans are co=ordinated with the operators of ports, airports, dangerous substances, critical infrastructure providers and other relevant private sector partners.

Figure 9. Crisis management framework in Ireland



Depending on the nature of the crisis Ireland has numerous crisis management bodies that bring together different governmental or non-governmental parties to discuss and co-ordinate the crisis response. According to the Framework of Major Emergency Management, the national response takes place at three levels: national, regional and local level.

The Government Task Force (GTF) on Emergency Planning

The GTF co-ordinates and oversees the emergency management policy and activities of all Government Departments and Agencies under their aegis. It provides political leadership and facilitates co-ordination of emergency management between Departments and Agencies on an ongoing basis. The GTF provides support for the policy initiatives of the Minister for Defence as chairman of the GTF, usually through specially tasked SubGroups. The SubGroups address emergency management matters to minimise the potential consequences of any given emergency. SubGroups report to the GTF as required or as directed by the chairman. **It also provides a platform for the sharing experiences and best practices** across Departments and Agencies.

The Lead Government Department (LGD)

LGD has the mandate and responsibility to co-ordinate all national level activities for its assigned emergency types. The LGD and designated auxiliary Government Departments/Agencies are responsible for the co-ordination of the **'whole of Government'** approach to specified emergencies during the emergency management cycle. The LGD facilitates promote collective decision-making and cohesive action among a broad range of organisations and groups which have a role to play at different levels. The LGD role includes:

- leading the risk management process encompassing risk assessment, prevention and mitigation;
- participation in the GTF;
- development of both generic and scenario-specific emergency plans, standard operating procedures and other guidance documents to enable it to manage the occurrence of assigned emergency types;
- devising and conducting appropriate exercises, evaluating the lessons learned from such exercises and putting them into practice;
- ensuring that arrangements are in place for receiving and reacting to alerts/warnings or notifications of emergencies and for monitoring (developing situational awareness) of ongoing situations;
- activation of its LGD role in the case of a specified emergency arising. If appropriate, a LGD may arrange for the declaration of a Major Emergency under the Framework for Major Emergency Management;
- maintaining ongoing communications with the public and key stakeholders, particularly during an emergency;
- chairing the National Emergency Co-ordination Group (NECG) in accordance with the lead roles assigned;
- establishing of appropriate forums comprising Departmental and other bodies in circumstances where it is not appropriate to convene a NECG;
- developing and maintaining working relationships with auxiliary Departments and Agencies through the ongoing communication, training and exercising. This can also include the provision of mutual support in the response phase;
- maintaining continuous collaboration with The Office of Emergency Planning (OEP);
- during the recovery phase, leading the recovery or handing over the lead to another Government Department where this is agreed;
- co-ordination of any international dimension to an emergency and any associated interdependencies. Where there is a significant international dimension to an emergency, the LGD

may establish an 'international' SubGroup with appropriate participation and may assign a relevant Department to chair this SubGroup.

However, the co-ordination role of the LGD does not imply interference with the role of any statutory body, but information and insight from the LGD and the NECG (when convened) should be shared with such bodies when necessary. Each participating Department and Agency should be able to carry out its normal organisational responsibilities as well as any additional roles agreed at the NECG. This type of co-ordination reflects the complex reality of emergencies, where multiple players and groups at different levels have a role to play.

The National Steering Group

There is also the National Steering Group which was established by the government decision (2006) replacing the Inter-Departmental Committee on Major Emergencies. The National Steering Group is mandated by the Government to oversee the implementation and the development of the Framework for MEM, essentially acting as the board of management for the Principal Response Agencies MEM (in terms of governance structures). This group comprises of representatives of five government departments (Housing, Health, Justice, Defence and Transport) and three Principal Response Agencies: An Garda Síochána, the Health Service Executive and the Local Authorities (through the City and County Managers Association). The National Steering Group is chaired and supported by a secretariat from the Department of Housing, Local Government and Heritage. The National Steering Group aims to drive continuous improvement, facilitating research, development, supporting knowledge sharing and learning in MEM.

The National Working Group draws on the expertise of the MEM Regions in Ireland to develop:

- guidance documents supporting the Framework objectives;
- protocol for the Inter-Agency working;
- co-ordination for interagency working at the planning stages;
- exercise;
- training.

The Principal Response Agencies are the agencies designated by the government to respond to Major Emergencies. PRA-s are An Garda Síochán (the national police service of the Republic of Ireland), the Health Service Executive and the Local Authorities. Each principal emergency service is a part of a larger principal response agency, e.g. the Fire Service is a Local Authority service. Due to the nature and complexity of Major Emergencies, the staff and resources of the wider agency are required, both to manage the consequences and aftermath of the major emergency event and to co-ordinate their response with the other agencies.[65]

Ireland has set out a l**ead agency** for different types of events. An example of different events and their leading agencies can be found in Appendix 2.[66] Certain situations, e.g. where an emergency affects an extensive area or occurs near the borders of Divisions of An Garda Síochána, the Health Service Executive Areas or the Local Authorities areas, there may be a response from the multiple units of the Principal Response Agencies. There should only be one Controller of Operations for each of the three Principal Response Agencies and it is necessary to determine from which unit of the Principal Response Agency the Controller of Operations should come.[66]

The Major Emergency Management Framework provides that the lead agency role may change over time to reflect the changing circumstances of the Major Emergencies. Ownership of the lead agency mantle should be reviewed at the appropriate stages of the Major Emergency. All changes in lead agency designation emanating from the site, and the timing thereof, will be by the agreement of the

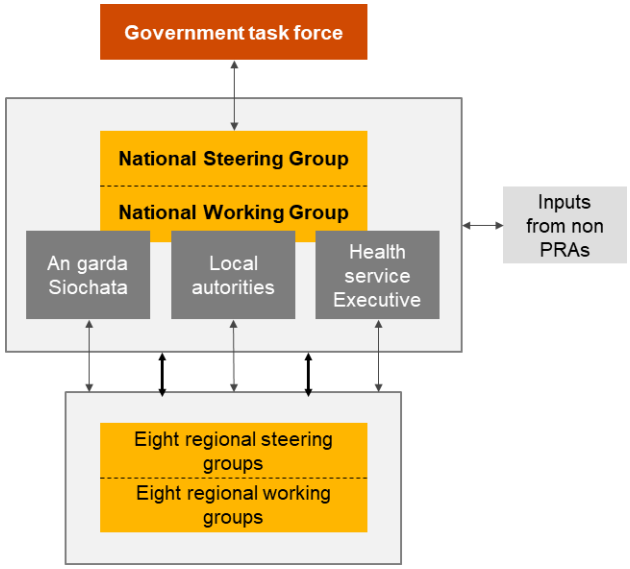
[65] Department of Housing, Local Government and Heritage (Government of Ireland)," Major emergency management: Your questions answered," published September 24, 2021, https://www.gov.ie/en/publication/20afc-major-emergency-management-your-questions-answered/

[66] Department of Housing, Local Government and Heritage (Government of Ireland), "A framework for major emergency management: Appendices," accessed April 28, 2022, https://www.justice.ie/en/JELR/Appendices2D.pdf/Files/Appendices2D.pdf

three Controllers of Operations (An Garda Síochána, the Health Service Executive Areas or the Local Authorities) and should be recorded and communicated as per the initial determination.[67]

Figure 10 gives a visual overview of the whole MEM system in Ireland.

Figure 10. Major Emergency Management in Ireland



2.3.1.3 Role of regions and municipalities

2.3.1.3.1 Role of regions

Eight Major Emergency Management Regions have been established in Ireland. Each Region undertakes annual work programmes to plan and prepare for Major Emergencies based on the risks identified through the Inter-Agency regional risk assessments. Local response to a Major Emergency may be scaled up to a regional level. This may occur where the nature of an emergency is such that:[68]

- the resources available in the local area where the incident occurs do not appear to be sufficient to bring the situation under control in an expeditious and efficient manner; or,
- the consequences of the emergency are likely to impact significantly outside of the local area; or,
- the incident(s) is(are) spread over the area of more than one Local Authority or Division of An Garda Síochána;
- the incident occurs at or close to a boundary of several of the Principal Response Agencies.

In each region a Regional Steering Group on Major Emergency Management is formed, comprising senior personnel from the Principal Response Agencies within that region. The primary role of the Regional Steering Group on Major Emergency Management will be to ensure that: [69]

- the regional aspects of preparedness set out in the Framework are delivered;
- an annual budget to support the regional preparedness activities is provided;
- a regional level Major Emergency Management development programme is prepared and implemented;

[67] Department of Defence (Government of Ireland),"Strategic Emergency Management: National Structures and Framework," published October 2017, https://assets.gov.ie/30731/2d1793da304a4169a2ff307d73e8af0c.pdf

[68] Department of Housing, Local Government and Heritage (Government of Ireland), "A framework for major emergency management: Appendices," accessed April 28, 2022, https://www.gov.ie/pdf/?file=https://assets.gov.ie/180184/4373b1f1-6068-4eed-9866-3331a3812256.pdf#page=null

[69] Department of Housing, Local Government and Heritage (Government of Ireland), "A framework for major emergency management: Appendices," accessed April 28, 2022, https://www.gov.ie/pdf/?file=https://assets.gov.ie/180184/4373b1f1-6068-4eed-9866-3331a3812256.pdf#page=null

- a regional level risk assessment is carried out;
- appropriate mitigation steps are taken in respect of priority risks;
- a Plan for Regional Level Co-ordination is prepared;
- Local and Regional Co-ordination Centres are designed and developed;
- the output from each Principal Response Agency's preparedness assessment is reviewed and validated.

There can also be the Regional Working Groups formed to support the Regional Steering Groups and to undertake the functions assigned at regional level. The membership of the Regional Working Group on Major Emergency Management should be drawn from the key personnel in the Principal Response Agencies. A Working Group chairman, who will report to the Regional Steering Group, should be appointed for a two-year term.[70]

2.3.1.3.2 Role of local authorities

The Local Authority should undertake the following functions arising from the Framework in the response to a Major Emergency:[71]

- declaration of a Major Emergency and notifying the other two relevant Principal Response Agencies;
- mobilisation of predetermined resources and activating predetermined procedures in accordance with its Major Emergency Mobilisation Procedure;
- acting as a lead agency, where this is determined, and undertaking the specified co-ordination function;
- protection and rescue of persons and property;
- controlling and/or extinguishing of fires;
- dealing with hazardous material incidents, including identification, containment, neutralisation and clearance of chemical spills and emissions;
-
- on-site decontamination (other than clinical decontamination) of persons affected (under medical supervision where necessary);
- advising on protection of persons threatened, by sheltering or evacuation;
- arranging/overseeing the clean-up of affected areas;
- limiting damage to infrastructure and property;
- provision of access/transport to/from the site of the emergency;
- provision of additional lighting required, beyond what the principal emergency services normally provide;
- assisting An Garda Síochána to recover bodies when requested;
- support for An Garda Síochána forensic work;
- support for the coroner's role, including provision of temporary mortuary facilities;

[70] Department of Housing, Local Government and Heritage (Government of Ireland), "A framework for major emergency management: Appendices," accessed April 28, 2022, https://www.gov.ie/pdf/?file=https://assets.gov.ie/180184/4373b1f1-6068-4eed-9866-3331a3812256.pdf#page=null

[71] Department of Housing, Local Government and Heritage (Government of Ireland), "A framework for major emergency management: Appendices," accessed April 28, 2022, https://www.gov.ie/pdf/?file=https://assets.gov.ie/180184/4373b1f1-6068-4eed-9866-3331a3812256.pdf#page=null

- accommodation and welfare of evacuees and persons displaced by the emergency;
- provision of food, rest and sanitary facilities as appropriate for the personnel involved in the response to the emergency;
- engaging any specialist contractors required to assist with the emergency operations;
- exercising control over any voluntary or other service it mobilises to the site;
- liaison with utilities regarding the restoration/maintenance/enhancing services provided to the site or to persons affected;
- site clearance, demolition, clear-up operations, removal and disposal of debris;
- monitoring and/or reporting on the impact in its functional area of any emergency/crisis which falls within the ambit of a 'National Emergency', and co-ordinating/undertaking any countermeasures in its functional area which are required/recommended by an appropriate national body;
- any other function related to its normal functions, which is necessary for the management of the emergency/crisis;
- any function which the On-Site Co-ordinating Group requests it to perform;
- maintaining essential Local Authority services (e.g. roads availability, fire and emergency operations cover, public water supply, wastewater treatment, waste disposal) during the Major Emergency.

2.3.1.4 Disaster loss

The number of deaths, missing persons and directly affected persons attributed to disasters has currently no centralised national source. Direct economic loss attributed to disasters is currently not reported at national level.[72] Therefore, Ireland does not currently quantify the cost of its emergencies nor carry out systematic disaster loss accounting.

Irish authorities do, however, consider estimated impact and cost of potential emergencies during the risk analysis. The potential impact of an emergency is estimated in three categories:[73]

- impact on life, health and residual welfare of a community;
- social/environmental impact. Social impact may be seen in terms of disruption/displacement of people affected by the event, while environmental is an impact on the physical area;
- economic impact in terms of costs of property/infrastructure damage as well as recovery costs or loss of economic production.

Impact analysis, however, is an educated guess or expert opinion formed in a discussion between the cross-sectoral experts rather than quantified data-driven calculation.

2.3.2 Methodologies applied

2.3.2.1 Creating a Major Emergency Plan by local government

There are no legislative obligations for local municipalities that oblige them to undertake the risk assessments. However, the local municipalities still perform them. Firstly, they see direct benefits for their preparedness in carrying out the assessment. Secondly, if an emergency occurs and the municipality is not able to respond properly (e.g. prevent loss of life), it **could be held legally responsible** for not being prepared for the safety of their people and not following the National

[72] Central Statistics Office, "Ireland's UN SDGs 2019: Report on Indicators for Goal 1 No Poverty," accessed April 28, 2022, https://www.cso.ie/en/releasesandpublications/ep/p-sdg1/irelandsunsdgs2019-reportonindicatorsforgoal1nopoverty/environment/

[73] Monaghan County Council, "Major Emergency Plan: Risk Register 2021," published January 2021, https://monaghan.ie/firebuildingcontrol/wp-content/uploads/sites/12/2021/01/Monaghan-County-Council-Risk-Register-2021.pdf

Guidance Principle as well as carrying out its MEM responsibilities. This, however, has not happened in practice and specific sanctions are yet unclear.

The guidance for the Major Emergency Plan is generic and universal for all regions, which means that everyone is working on the same standard. The creation of a Major Emergency Plan follows a four-step process. [74]

I Risk assessment

The county must identify risks applicable to them and then plan according to the priorities identified. The risk assessment process comprises of four stages:

1. **Establishing the context** - the purpose of this stage is to describe the characteristics of the area for which the risk assessment is being completed, as this will influence both the likelihood and the impact of a Major Emergency. Establishing the local context enables a better understanding of the vulnerability and resilience of the area to emergencies.
2. **Hazard Identification - t**he generic threats that exist in all communities are sometimes taken for granted (e.g. fires, road traffic accidents, accidents involving transport of people, hazardous materials, building collapse). The purpose of this stage is to review and note the generic hazards, including any features of the hazards specific to the region, and then to add the hazards that are specific to the local area. The hazards faced fall into four commonly used categories:
    a. natural;
    b. transportation;
    c. technological;
    d. civil.
3. **Risk assessment -** the third stage is to consider the overall risks presented by these hazards. Risk assessment starts with an examination of the impact (severity of consequences to life and health, property and infrastructure, and the environment) of the hazards identified. The probability must also be considered and the resulting judgement recorded on a risk matrix in the next stage. The basis for making this judgement should be set out on the individual hazard record sheet and should include sources which influence the judgement (e.g. national level intelligence and advice from available centres of expertise, information from risk holder/risk regulator). A five-point scale is proposed for categorising both impact and likelihood. In considering the potential impact of a hazard, it is relevant to take two factors into account: the type or nature of the impact, and the scale. The type or nature of the impact may be considered in three fields:
    a. impact on life, health and residual welfare of a community;
    b. social/environmental impact. Social impact may be seen in terms of disruption/displacement of people affected by the event, while environmental is an impact on the physical area;
    c. economic impact in terms of costs of property/infrastructure damage as well as recovery costs or loss of economic production.
4. **Recording the hazards**. A five-by-five matrix, using the scales for impact and likelihood, is used to present the results of the risk assessment. The process requires the outcome from the risk assessment to be recorded and inserted in the box judged to be most appropriate for the functional area under consideration. Multiagency perspectives can help bring balance to this task. The risk assessment exercise records, in a readily presentable format, the combined judgement of the Principal Response Agencies regarding the identified hazards in the area. Risk management starts with an examination of the potential impact of the hazards identified and the likelihood of the hazard occurring within the county. The resulting judgement is recorded on a risk matrix for each event. The risk assessment provides a sound basis for determining a range of steps at the later

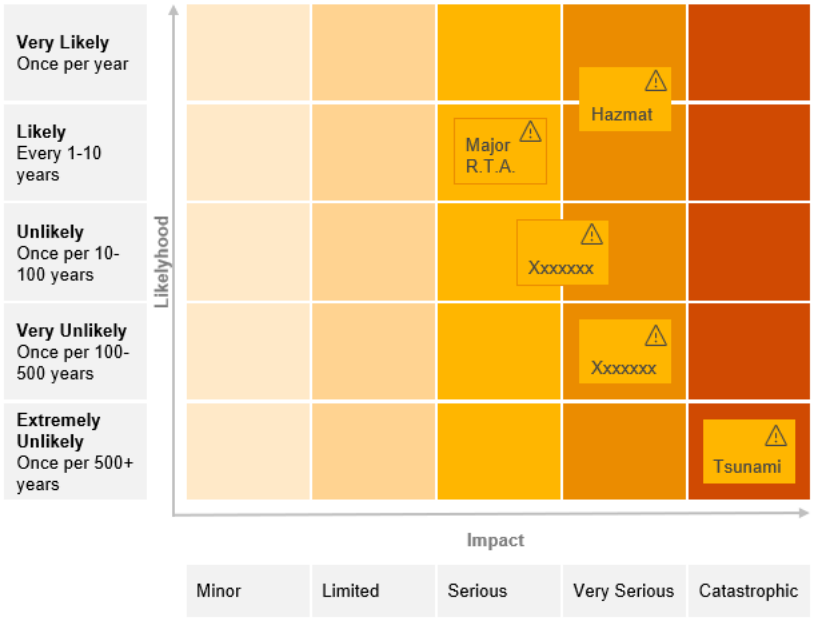
[74] Monaghan County Council, "Major Emergency Plan: Risk Register 2021," published January 2021, https://monaghan.ie/firebuildingcontrol/wp-content/uploads/sites/12/2021/01/Monaghan-County-Council-Risk-Register-2021.pdf

stages of the emergency management cycle, especially in the Mitigation and the Planning and Preparedness stages.[75]

II Using a risk matrix to visualise the risks

The matrix includes the classification of the likelihood of an event and the classification of an impact. Example of such matrix is presented in Figure 11. In most cases Ireland uses a generic all-hazards approach to risk assessment. Scenario-based approach could also be used, however, this is not a common practice among the national and local authorities. Flood management, for example, is an exception where scenario-based and data-driven risk assessment takes place, as it is required by the EU's Floods Directive. In most cases the impact and likelihood assessment is qualitative (based on the expert opinions) of relevant sector experts or risk and crisis management professionals.

Figure 11. An example of a risk matrix used in Major Emergency Planning



III Contextualising the risks

The risks are put into context. This is done by profiling the county, and the profiling includes many categories. For example, one of the categories is the social aspects of the county, which includes a demographic summary of the population, the population of major centres, primary economic drivers and details about the workforce, namely the major private sectors, the size of the tourism industry and the agricultural industry. This also includes the number of schools, the number of students, principal emergency services and their locations. More detailed examples can be found in Appendix 5.

IV Using the hazard identification template

The examples can be found in Figure 12 below.

[75] Monaghan County Council, "Major Emergency Plan: Risk Register 2021," published January 2021, https://monaghan.ie/firebuildingcontrol/wp-content/uploads/sites/12/2021/01/Monaghan-County-Council-Risk-Register-2021.pdf

Figure 12. Hazard identification

Natural Hazards			
Category	**Type**	**Sub-type**	**Local Hazard**
Meteorological	- Storm / Severe Gales - Heavy Snow	- High wind (Gales) - Blizzards & snow drifts	Anywhere in Co. Monaghan
Hydrological	- Prolonged Heavy Rainfall / Flooding	Surcharging existing drainage capacity	Anywhere in Co. Monaghan
Other	Drought	Forest fires during prolonged dry periods	Forest Areas of Co. Monaghan

Transportation Hazards			
Category	**Type**	**Sub-Type**	**Local Hazard**
Aviation	Aircraft	- Mid Air Collision - Malfunction - Terrorism attack	- Explosion above Monaghan - Emergency landing anywhere in the county
Rail	Passenger train	- Derailment - Train Collision	Not applicable to Co. Monaghan
Road	RTA (any vechicle)	- Hazmat - Major RTA	- Explosion on primary route or built up area involving multiple vehicles - Multiple car pile up - Bus Crash on any public road
Water	- Recreational Activity	- Collision - Sinking	- Any water way within the county - Anywhere along the coast

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2.3.2.2 Disaster loss

As also mentioned in chapter 2.3.1.4, the disaster loss accounting does not take place as a post-event activity, but a similar concept is used in assessing the potential impacts of risk events. In particular, the type or nature of the impact may be assessed in three areas:

- impact on life, health and residual welfare of a community;
- social/environmental impact. Social impact may be seen in terms of disruption/displacement of people affected by the event, while environmental is an impact on the physical area;
- economic impact, in terms of costs of property/infrastructure damage as well as recovery costs or loss of economic production.

As mentioned before, the number of deaths, missing persons and directly affected persons attributed to disasters has currently no available centralised national data source. Direct economic loss attributed to disasters is currently not reported at national level. Therefore, currently there are no prescribed methodologies deployed in quantifying or assessing the risk impacts (i.e. disaster loss) and in most cases the risk impact assessment (and placement to risk impact scales) is based on the expert opinions.

2.3.3 Recommendations for the potential business needs

A mapping of Irish risk and crisis management practices indicates a number of good practices that Estonia could implement. These are presented below.

Municipality's profiling. Each county is responsible for assessing the main risks they have, including the impact the risk would have when a certain event occurs. This includes having a demographic summary of the population, the distribution of the population and population major centres. This also includes primary economic drivers, the distribution of the workforce and major private sector

companies. Many more categories have been written out during the profiling, such as the main tourist attractions, sports fields, the size of the agricultural industry, number of schools and the number of students studying in them, principal emergency services and their locations, the main geographical characteristics of the region, etc.

Having a standardised written profile of the municipality and its main characteristics would help the local municipality to better determine the links between the risk/threat and its potential impact and allow relevant crisis responsible agencies (such as the RB) to assess the completeness/quality of the risk assessment as well as provide the necessary guidance on how to improve it.

Predefined (example) list of risks/potential emergency events with main responsible institutions. Over time, Ireland has compiled a list of c. 50 emergency events that should be considered during the risk assessments. This guarantees that the common risks will not be overlooked, and it also creates a good basis for comparison among the different local municipalities. In addition, the risk list includes the nomination of the main institution which takes the responsibility in case the respective event occurs, and lists out other principal support provider institutions. This would be helpful also in Estonian practice as one of the main issues that the Estonian local municipalities currently face is the lack of knowledge about responsibility, e.g. who is responsible for what in case of a crisis and what specifically is expected from the local municipality. In various risk situations there is an uncertainty about who should lead a crisis and who should be in the place of assisting the leading institution. Having a clear predefined list with all the potential crisis events and their leading stakeholders would clearly be beneficial.

Implementation approach. Since risk assessments are not compulsory for the local municipalities, they have successfully managed to make all local municipalities regularly carry out the assessments. As risk assessment has been regularly carried out in Ireland for decades, it no longer requires the force of the law. This is something to keep in mind, whereas making risk assessments mandatory for the Estonian municipalities may be politically difficult. Additionally, it should be considered that a legislative obligation may have an opposite effect by turning the perception of the risk assessment process into a ‘tick in a box’ exercise rather than an important activity to increase the risk awareness in the municipality.

2.4 Country 3 – the Netherlands

Table 12. Abbreviation - the Netherlands

Term	Definition
ANV	The National Safety Analysis Network
CoPI	The team in command at the scene of the incident
DCC	Departmental Co-ordination Centre
GHOR	A government organisation responsible for medical assistance at major accidents, disasters, and crises.
GRIP	Co-ordinated Regional Incident Response Procedure
ICCb	Interdepartmental Committee for Crisis Management
MCCb	Ministerial Crisis Management Committee
NCC	National Crisis Centre
NCTV	National Co-ordinator for Counterterrorism and Security
NCTV	The National Co-ordinator for Security and Counterterrorism
NRA	National Risk Assessment

NRP	The National Risk Profile (2016)
NRB	The National Risk Profile (2014)
NVS	National Security Strategy
PCC	Provincial Co-ordination Centre
RCC	Rescue Co-ordination Centre
ROT	The Regional Operation Team

2.4.1 General overview of the Netherlands in the context of crisis management and disaster loss methodology

2.4.1.1 General institutional set-up of local governments and their governance[76]

There are 390 municipalities in the Netherlands. Municipalities have autonomous powers to decide on many issues. Municipalities also implement many national laws, such as the ones requiring them to issue passports and identity cards to their residents.

Some of the tasks which the local municipalities must do are the following:

- keep a record of who lives within their boundaries, through the Personal Records Database (BRP);
- issue official documents, such as passports or identity cards and driving licences;
- pay benefit to those who cannot provide for themselves;
- be responsible for the Social Support Act (WMO), the Participation Act and youth care;
- be responsible for school buildings and allocate additional funding to support pupils who require extra support;
- draw up land-use plans designating residential, industrial and green areas;
- supervise the construction of homes in consultation with housing associations;
- build and maintain streets, pavements and cycle paths;
- implement the Environmental Management Act which requires that different types of household waste are collected separately;
- award grants to local services, such as swimming pools or libraries;
- ensure industrial parks are easily accessible;
- issue permits for market traders.

2.4.1.2 Dutch approach to security and crisis management

Crisis Management is a co-ordination and decision-making about the entirety of measures and facilities that the national government takes in co-operation with the public and private partners involved in a situation in which national security is at stake, or in another situation where there is or could be a major societal impact. National security is at stake if one or more vital interests of the Dutch state and/or society are threatened to such an extent that there is a (potential) societal disruption. These vital interests are:

- Territorial security: the unimpeded functioning of the Netherlands as well as its EU and NATO allies as independent states in the widest sense or their territorial integrity in a narrow sense.

[76] Government of the Netherlands, ”Municipalities’ tasks,” accessed April 28, 2022, https://www.government.nl/topics/municipalities/municipalities-tasks

- Economic security: the undisturbed functioning of the Netherlands as an effective and efficient economic security.
- Ecological safety: the unimpeded continued existence of the natural living environment in and around the Netherlands.
- Physical safety: the unimpeded functioning of people in the Netherlands and its surroundings.
- Social and political stability: the unimpeded continued existence of a social climate in which individuals can function without being disturbed and groups of people enjoy living together within the benefits of the Dutch democratic system and values shared therein.
- International legal order: the proper functioning of the international system of norms and agreements aimed at promoting international peace and security.

National Risk Assessment[77]

In 2018, the Dutch Government decided to develop a long-term National Security Strategy (NVS). To draw up this strategy, an understanding of the most important risks for Dutch national security over the upcoming years was needed. Therefore, the National Co-ordinator for Security and Counterterrorism (NCTV) asked the National Network of Safety and Security Analysts (ANV) to produce a **National Risk Assessment (NRA)**. The network structure of the National Network of Safety and Security Analysts can be found in Figure 13.

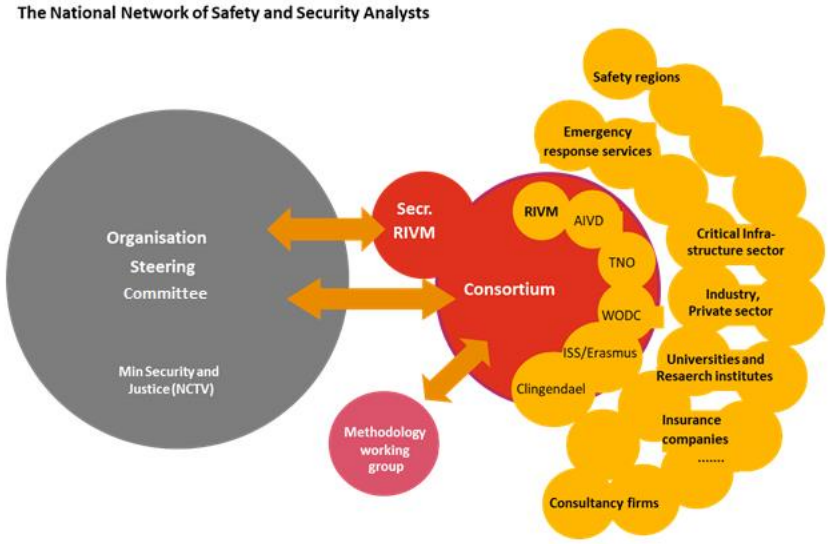
The NRA is the foundation for the new National Security Strategy. The aim of the NRA is to provide an understanding of the main risks for Dutch national security in the next five years. It provides an overview of the main risks attributed to different disasters, crises and threats with potentially disrupting effects on society.

The NRA takes two aspects into account when determining which risks pose the greatest threat to the Dutch society: their impact on the six national security interests and the likelihood of occurrence. **Viewing these two dimensions separately from each other is a deliberate choice**.

In addition to impact and likelihood, NRA also analyses the context and recent developments regarding the different risks under evaluation. This also applies to interdependencies and connections between the different risk categories and themes. Consequently, both risks and threats are viewed from a broader perspective, resulting in an integrated risk analysis**. Questions concerning resilience and capacity building have not been considered in the national risk assessment.**

[77] "National Risk Assessment: The National Network of Safety and Security Analysts" 2019, https://english.nctv.nl/binaries/nctv-en/documenten/publications/2019/09/18/dutch-national-risk-assessment/Dutch+National+Risk+Assessment++2019.pdf

Figure 13. The National Network of Safety and Security Analysts



An important foundation for the National Risk Assessment was the 2016 National Risk Profile (NRP), commissioned by the NCTV and produced by the ANV. In addition to the NRP, other documents containing assessments, including ANV and third-party publications, were also reviewed while establishing the new National Risk Assessment. The process also involved several different analyses and expert consultations.

Figure 14. Schematic summary of the process contains a schematic summary of the process. Firstly, for each of the risk categories mentioned in the NRP a literature review was conducted with the aim to further examining recent developments and validate the conclusions of the 2016 NRP. Secondly, the results were documented in the thematic reports, together with the scenario descriptions, impact, likelihood scores as well as the accompanying analysis.

Figure 14. Schematic summary of the process

Based on the assessment, ANV created an overview of risks that have both high impact as well as high probability. The NRA mostly adheres to the grouping of themes and risk categories in the NRP. However, there was an evaluation of whether additional risks and/or trends need to be included in the NRA. This evaluation was based on the up-to-date documents and reports.

As mentioned before, the National Risk Assessment identifies six national security interests. To understand how different events influence these priorities, these priorities have been tied to relevant impact criteria as well as the most relevant risk categories that could cause the impacts mentioned and harm the priorities. A visual presentation of this system can be found in Appendix 14.

To present an overview of the most important disasters, crises and threats, an ‘all-hazards’ approach has been applied. Both non-malicious and malicious threats (safety and security) as well as internal and external risks and threats are included in this type of risk analysis. Since different risks are analysed and assessed in the same manner, they can be compared to each other. The results of the analyses are recorded in several thematic reports. Appendix 15 gives an overview of these themes and risk categories.

It is important to know that the safety regions have fewer risk themes to classify. In Appendix 16 it is possible to see an overview of the overall and differences between the national and regional themes.

2.4.1.2.1 Crisis management at national (ministry) level

At national level **each ministry is responsible for the crisis management measures to be taken** (preparation, response and aftermath) **in its own policy area**, for financing these measures and for ensuring that they are properly co-ordinated with the co-ordinating Minister of Security and Justice, with the other national parties and the public and private partners involved.[78] **A ministry is also responsible for setting frameworks for the crisis management measures to be taken by the vital companies, institutions and objects insofar as these entities fall under its responsibility**.

The Minister is responsible for an adequate approach to a crisis in their policy area. If the crisis is a matter of national concern, the Minister immediately informs the Minister of Security and Justice. Where appropriate, the Minister and the Minister of Security and Justice shall closely co-ordinate measures and communication.

Departmental response activities within are carried out and co-ordinated by the responsible Departmental Co-ordination Centre (DCC) or another designated unit within the responsible ministry. If the involvement of other policy sectors is required, they would be involved by the ministry to which the sector in question belongs, unless it has been agreed to be done through an intervention by the National Crisis Centre (NCC). The communication regarding the decision-making process with provinces, safety regions and municipalities takes place via the Minister of Security and Justice through the NCC, unless the legislation provides otherwise. In that situation, the relevant ministers inform the Minister of Security and Justice simultaneously.

If necessary, an Interdepartmental Committee for Crisis Management (ICCb) may be convened on a high official level (Director General level) and chaired by the National Co-ordinator for Counterterrorism and Security (NCTV). The decision to convene the ICCb is taken by the chairman, after consultation with the lead ministry and simultaneously informing all other ministries.

The tasks of the ICCb are the following:

- exchanging the information and identifying information gaps;
- conducting and assessing the situation;
- deciding on measures, both based on the advice from the Interdepartmental Co-ordination Consultative Committee and without;
- advising the Prime Minister, Minister of General Affairs, and the Minister of Security and Justice regarding the meeting of the Ministerial Crisis Management Committee;
- advising the ministerial committee and/or other authorities on the co-ordination and decision-making process of the whole set of measures;
- advising on (international) political consequences of measures taken or to be taken;
- determining strategic frameworks;
- drafting instructions for the civil service;
- determining the policy frameworks for (public) information and communication;
- determining the structure and frequency of meetings.

The chairman determines the composition of the ICCb after consultation with the DG of the lead ministry. The ICCb consists of the following stakeholders:

- NCTV;

[78] Ministry of Justise and Security (Government of the Netherlands),"Nationaal Handboek Crisisbesluitvorming," accessed April 28, 2022, https://www.nctv.nl/documenten/publicaties/2016/09/13/nationaal-handboek-crisisbesluitvorming

- Council Advisor, the Ministry of General Affairs;
- representatives at the DG/State General level of the responsible ministries (mandated by their ministers) and a maximum of one advisor;
- Head of the National Crisis Centre, secretary;
- subject matter experts (experts in a specific field, or expert representatives of other governments, administrations or (vital) sectors) may attend an ICCb meeting on an ad hoc basis if invited by the ICCb chairman.

Co-ordination and decision-making at the political-administrative level

In the event of a situation in which national security is or may be at stake, or which otherwise has or may have a major impact on society, it may be desirable for the national government to ensure the co-ordination and decision-making at the political-administrative level. Pursuant to Article 25, first paragraph of the Rules of Procedure for the Council of Ministers, the Ministerial Crisis Management Committee (MCCb) exists for this purpose and can be convened in such situations.

Permanent members of the Ministerial Commission are the Prime Minister, the Minister of General Affairs, and the Minister of Security and Justice. Any Minister or State Secretary may request the Minister of Security and Justice to convene a meeting of the Commission. The Chairman of the Commission decides on the request in agreement with the Prime Minister, the Minister of General Affairs and, after consultation, with the Minister or State Secretary who is primarily responsible for the matter to which the request relates.

The decisions of the MCCb form the framework for their implementation by the public and private partners. The Minister of Security and Justice, as a co-ordinating minister for crisis management, is responsible for monitoring the implementation of the decisions taken by the Committee and informs the Council of Ministers about this and any problems with the implementation. The (inter)departmental implementation of the Committee's decisions is the responsibility of the relevant ministers and is co-ordinated by the DCCs and, if necessary, also in the Interdepartmental Co-ordination Committee. Figure 15 explains the whole decision-making process in the Netherlands.

Figure 15. Decision-making in the Netherlands

2.4.1.3 Role of regions and municipalities

At regional level, the Netherlands is divided into 25 safety regions (veiligheidsregio's)[79]. Each safety region is dedicated to the safety of the inhabitants and visitors of that area (see Figure 16).

[79] Central Government (Government of the Netherlands), "Veiligheidsregio's en crisisbeheersing," accessed April 28, 2022, https://www.rijksoverheid.nl/onderwerpen/veiligheidsregios-en-

The tasks and organisation of a safety region are also described in the Safety Regions Act. It also describes the responsibilities of, e.g. the mayor and the chairman of the safety region in the event of a fire, disaster or crisis. **According to the Safety Regions Act, the regulations referred to in Article 9 assign the following tasks and authorities to the administration of the safety region[80]:**

- compiling an inventory of the risks of fires, disasters and crises;
- advising the competent authority regarding the risks of fires, disasters and crises in the cases designated by or pursuant to the law and in the cases determined in the policy plan;
- advising the Municipal Executive regarding the task referred to in Article 3, first paragraph;
- Preparing for the firefighting as well as organising disaster relief and crisis management;
- setting up and maintaining a fire service;
- setting up and maintaining an GHOR[81];
- providing the control room function;
- acquiring and managing common equipment;
- Organising and maintaining the provision of information within the services of the safety region, between these services and the other services and organisations involved in the above-mentioned tasks.

crisisbeheersing/veiligheidsregios#:~:text=Nederland%20is%20verdeeld%20in%2025,aanpak%20van%20rampen%20en%20crises

[80] Safety Regions Act https://wetten.overheid.nl/BWBR0027844/2017-12-01

[81] GHOR is a government organisation responsible for medical assistance at major accidents, disasters and crises. In addition to the fire brigade, police and municipality, the GHOR is one of the 'assistance columns' of disaster relief.

Figure 16. Safety regions in the Netherlands

The mayor is responsible for the proper response to a fire, disaster or crisis (or threat thereof) in his municipality. **If a fire, disaster or crisis occurs in several municipalities at the same time, then the chairman of the safety region is responsible for the approach in their region.** The Netherlands has 12 safety regions along its national border. These regions must co-ordinate their crisis plan with their neighbouring country/countries. Consequently, it may happen that the Dutch fire brigade extinguishes a fire in Germany and vice versa.

The safety regions are largely (approximately 85%) financed by the municipalities from the Municipalities Fund. The safety regions also receive money from the central government to carry out their tasks. In 2019, the central government's contribution was approximately €181 million. This is about 15% of the money that the safety regions receive. The Justice and Safety Inspectorate supervises the safety regions. It carries out (periodic) investigations into the preparation of fire services, crisis management and disaster management. The report 'State of the Disaster Relief 2016' is the most up-to-date report on this subject. In 2020, the Inspectorate published the 'Periodic Report on Disaster Response and Crisis Management 2019', currently the most recent version[9]. In this report the focus lies on four topics, namely: ensuring the professional competence of crisis officials, quality assurance, co-operation and operational performance.

Safety region board

The board of a safety region consists of all mayors of that safety region. One of these mayors is appointed by the Royal Decree to chair the safety region. This is usually the mayor of the largest municipality. **The board of a safety region is responsible for establishing and maintaining the fire service, the GHOR, preparing for the fires, and organising disaster and crisis management as mentioned in the tasks of the safety regions**. The 25 chairmen of the safety regions together form the Safety Consultative Council. The Safety Board discusses national safety issues and monitors safety developments. Twice a year, the Minister of Justice and Security holds the consultations with the entire Security Council.

According to Article 4 of the Safety Regions Acts[82], the **board of the safety region must draw up a policy plan at least once every four years regarding the organisation of disaster and crisis management**, in which the policy is laid down regarding the tasks of the safety region[83]. Disasters are categorised by the Dutch Government according to the types of causes and the same applies to the types of crises as mentioned in the National Safety Profile, but categorised by the types of disruption and course (see Appendix 13

The policy plan must contain:

- a description of the intended operational performance of the services and organisations of the security region, police and municipalities within the framework of disaster relief and crisis management;
- an elaboration, taking into account the circumstances in the safety region in question, and the national targets established by the Dutch Minister;
- an information paragraph, describing the information provision within and between the services and organisations referred to in point a);
- an exercise policy plan;
- a description of the non-statutory advisory function;
- the turnout times applicable to the fire brigade and a description of the presence of fire stations in the municipalities as well as other facilities and measures required for the fire brigade to meet these times.

2.4.1.3.1 Crisis management at regional level

Situations with a major impact on society are: local or regional incident, an accident with many victims, an incident or accident abroad with many Dutch victims, or events with an (inter)national impact in the Netherlands. **In local or regional situations, incidents or events are usually dealt with by the authorities operating at that level** (such as safety regions, the municipality or the water authority ('waterschap') and organisations). Depending on the nature and scope, several organisations may be deployed (horizontal and/or vertical upscaling). **The safety regions use a nationally uniform GRIP scaling-up system for the different levels of scaling-up.** If a situation, incident or event has inter-regional significance, the chairman of the source region is in charge of maintaining public order and general public safety.

The GRIP (Co-ordinated Regional Incident Response Procedure) structure (see Figure 17) was created to organise the upscaling of the emergency services in an orderly manner. GRIP relates to the organisation of the disaster response and crisis management by the emergency services of the safety region.

[82] Wettenbank, "Wet veiligheidsregio's," published January 01, 2019, https://wetten.overheid.nl/BWBR0027466/2019-01-01#Paragraaf3

[83] An example of a crisis plan from one of the safety regions can be found here:
Bureau Gemeentelijke Crisisbeheersing Haaglanden, "Regionaal Crisisplan Rampenbestrijding en Crisisbeheersing," published January 30, 2019, https://www.vrh.nl/sites/default/files/2020-04/Regionaal%20Crisisplan%20Haaglanden.pdf

Figure 17. GRIP scale-up structure

The main structure of the regional crisis organisation consists of the following components: Joint Control Room, Incident Command, Regional Operational Team and Municipal or Regional Policy Team.[84] In the organisational structure, one-man leadership is the co-ordinating mechanism.

Joint Control Room

In the regular routine way of working reports (at regional level) are handled by the Joint Control Room. However, the Joint Control Room plays an important role in the first phase of an incident and must act quickly and decisively to raise an alarm. In most cases, multidisciplinary co-operation begins here. If an incident occurs from the level GRIP 2, the crisis co-ordinator may decide to use the crisis room to deal with the incident in question. At the Joint Control Room, the other operators can then focus on the regular control room process. The tasks and authorities of the joint control room are (non-exhaustive):

- alerting and deploying personnel and facilities at the right place and time, and in the right quality and quantity, including alerting (parts of) the main crisis management structure;
- providing the information to the emergency services;
- alerting (parts of) the main crisis management structure;
- alerting the relevant partner organisations;
- drawing up and continuously updating the control room image in the event of an (expected) upscaling to GRIP 1 or higher in the National Crisis Management System;
- monitoring and adjusting the deployment of required facilities.

Incident Command

An Incident Command is charged with the operational management at the incident location. The Incident Command focuses on achieving operational performance to the extent that this can be overseen and managed from the incident location. In addition, the Incident Command takes care of co-ordination with other involved parties and advises the regional operation team. The tasks and authorities of the Incident Command are (non-exhaustive):

[84] Bureau Gemeentelijke Crisisbeheersing Haaglanden, ”Regionaal Crisisplan Rampenbestrijding en Crisisbeheersing,” published January 30, 2019, https://www.vrh.nl/sites/default/files/2020-04/Regionaal%20Crisisplan%20Haaglanden.pdf

- multidisciplinary co-ordination on location;
- leading the incident response on-site;
- operationalising the required capacity;
- Co-ordinating with the parties involved at the incident site;
- providing information to the press and the public about the operation at the scene;
- multidisciplinary upscaling;
- providing solicited and unsolicited advice to the Regional Operational Team (ROT);
- providing solicited and unsolicited advice to the local government since the ROT is not (yet) operational.

Regional Operational Team

The Regional Operation Team (ROT) focuses on (the preparation of) the incident response that cannot be overseen and directed from the incident site or if there is no incident site. A Regional Operation Team is charged with the operational leadership, co-ordination with other parties involved in the disaster or crisis and advising the Municipal or Regional Policy Team on the overall incident. In addition, with disasters and crises for which several Incident Commands have been set up, the Regional Operation Team has a co-ordinating task. The tasks and authorities of the ROT are (non-exhaustive:

- multidisciplinary co-ordination of the incident response regarding the total incident;
- charting and managing (long-term) effects (scenario thinking);
- managing and facilitating a CoPI (team in command at the scene of the incident);
- Co-ordinating the deployment of several CoPI's;
- directing the exchange of information;
- advising the Municipal or Regional Policy Team;
- formulating and preparing strategic decision points for the Municipal or Regional Policy Team;
- translating administrative/strategic decision points into tactical and operational execution;
- determining and monitoring operational performance within the set administrative frameworks;
- advising the mayor and/or chairman of the safety region on multidisciplinary upscaling.

Municipal Policy Team

A Municipal Policy Team is charged with supporting the mayor in the execution of the supreme command. The team members act as advisors to the mayor. Only the mayor is authorised to make the decisions. The tasks and authorities of the Municipal Policy Team are (non-exhaustive):

- providing support to the mayor;
- advising on the crisis communication strategy;
- anticipating risks with long-term effects;
- administrative co-ordination at local level and with the parties involved in the incident;
- providing policy frameworks to the ROT;
- advising the mayor on proposals by the ROT.

Regional Policy Team

A Regional Policy Team is charged with supporting the chairman of the safety region. The chairman of the safety region calls a Regional Policy Team together after he has determined that the disaster or crisis is of more than local significance (or serious fear of its occurrence). The chairman determines which mayors are members of the RBT and therefore which municipalities are involved in the incident. The team members act as advisors to the chairman. Only the chairman has the decision-making authority. The Regional Policy Team has the following tasks (non-exhaustive):

- giving support to the chairman of the safety region;
- advising on the crisis communication strategy;
- administrative co-ordination at regional level and with the parties involved in the incident;
- advising policy frameworks to the ROT;
- advising the chairman of the safety region on proposals by the ROT.

2.4.1.4 Disaster loss

The Dutch Government has not put in place a disaster loss accounting methodology. However, they have recognised a need to implement a national data steward, a government-wide data strategy and standards, and a data catalogue. Together with the National Statistics Office of Canada, Dutch Central Bureau for Statistics (CBS) has investigated the possibilities of improving data quality in crisis situations and made recommendations[85]. This is a precondition for establishing a disaster loss accounting or modelling system.

2.4.2 Methodologies applied

Detailed information about the methodologies used in the Netherlands is not available in public documents (or not yet discovered). Therefore, this chapter will be supplemented, based on the practice exchange with the Dutch officials.

2.4.2.1 Crisis management[86]

The NRP is an all-hazards overview of the risks related to the various disasters, crises and threats with a potentially disrupting effect on society. Various definitions and approaches exist regarding the concept of risk, which are used in risk analyses in various fields such as economics, finance, mathematics, engineering, security, medicine and social sciences. A common approach is to view **risk as the product of the possibility of an event** and the **scope of the consequences** (damage) of that event. More recent approaches also consider the **vulnerability** of an organisation, system or structure in this quantitative approach to risk. Social science research has shown that qualitative aspects such as the degree of (supposed) voluntariness, fairness, manageability or the familiarity with, and the social utility of a risky activity also play an important role when assessing risks and related behaviour. **Risk is therefore a multidimensional concept which can be both subject to 'objective' calculation as well as interpreted as a 'social construct'**. A procedural approach is used in the analyses performed for the National Risk Profile (NRP). Regarding the knowledge and methods, it concerns the following aspects:

- data collection (historical cases, indices, practical experience, expert knowledge, etc.);
- the process of analysis (models, multi-criteria analyses, processing input from experts);
- risk presentation (impact and likelihood scores, diagrams, descriptions);

[85] Masja de Ree, "Het belang van betrouwbare data in tijden van crisis," CBS, published January 06, https://www.cbs.nl/nl-nl/corporate/2022/01/het-belang-van-betrouwbare-data-in-tijden-van-crisis

[86] "National Risk Profile 2016: An All Hazard overview of potential disasters and threats in the Netherlands" https://www.rivm.nl/sites/default/files/2018-11/Dutch%20National%20Risk%20Profile%202016_english.pdf

- determination of uncertainties, where it is distinguished between ignorance, uncertainty, ambiguity and indeterminacy.

Due to the usually limited availability of data and models, the assessment of both impact and likelihood is largely based on the estimates by experts. A protocol was developed in order to process the expert opinions, based on three points of the departure:

1. The assessment of the scenarios and theme analysis will be done during the sessions attended by all experts.
2. The opinion of every expert participating in a session counts.
3. Experts may have different opinions which are considered in the uncertainty of both impact and likelihood.

Bow-tie analysis

This methodology is based on the scenarios which are placed in a fixed scoring methodology. The scenarios are narrative descriptions of disasters, threats and crises which are required to comply with a certain format in order to facilitate an adequate risk assessment using the scoring methodology. The scoring methodology was designed to determine the impact and likelihood of each scenario and the corresponding risk.

The various elements in this bow-tie model (context, causes and triggers, consequences and possible cascade and cascading effects, mutual interdependence. vulnerabilities) are fixed parts of each scenario. In the National Risk Profile, the risk assessment per risk category is based on an analysis of the entire spectrum of scenarios derived from the building blocks and factors which together determine the risk. These elements provide the basis of the scenario spectrum and of the estimation of likelihood and impact including their bandwidth. In fact, risks do not manifest themselves in a single form but in many forms with various likelihoods and impacts: from low likelihood of major consequence to high likelihood of small consequence and everything in between. It is also important to gain an insight into the determining factors which arise or escalate a disruption, and into the consequences and related (cascading) effects: ‘Where are the tipping points in the cause-and-effect chain?’, and ‘What makes an incident or crisis score higher or lower on the impact criteria?’.

The risk assessment also examines the existing capabilities and possible vulnerabilities in the field of anticipatory actions, prevention, preparation, repression (response and effect control), aftercare and recovery.

In order to place the various categories of risks in a comparative perspective – one of the most important goals of the NRP – two scenarios are selected per risk category based onf the bow-tie analysis and the building blocks, generally a normative and a conceivable worst-case scenario. The scenarios are short narrative descriptions of a disrupting event including causes and effects intended to outline a common image for experts, policymakers and professionals, and to determine impact and likelihood by way of the scoring methodology. This way an indication and bandwidth of each risk category is acquired. The selected scenarios serve as illustrations for the risk categories. The assessment of risks is based on the range of possible scenarios related to a particular type of a disaster, threat or crisis. **An illustration of the bow-tie analysis can be found in Appendix 17**.

The scoring methodology: risks in a comparative perspective

According to the 2014 National Risk Assessment (NRB), each scenario is assessed using a **fixed scoring methodology**. This scoring methodology was designed in order to determine the impact and probability of each scenario and the corresponding risk. Over the years, the scoring methodology has been adjusted several times based on experiences with its application in the successive NRA. Examples of the scoring criteria can be found below in Appendix 18, Appendix 19 and Appendix 20. **The results of the risk analyses** using the scoring methodology are presented in Appendix 21All the

risk events are visualised on a risk matrix according to their impact and likelihood. Risk matrix which presents the overall impact and likelihood of the selected scenarios is presented in Appendix 22.

2.4.3 Recommendations for the potential business needs

Recommendations for business needs can be made only based on the desktop research as the validation interviews with the Dutch authorities were not possible. The Dutch case study is a good example if the Beneficiary would like to consider establishing a regional level for the Estonian crisis management system.

Overall, it is efficient that the Netherlands has divided itself into different **safety regions**. As of now, Estonia does not have a regional level in the crisis management structure. A recommendation for Estonia would be to consider the possibility to empower regions with further crisis management tasks. This would allow to create a regional view, validate the municipal risk analyses and create an opportunity for peer review and feedback.

Another good practice which the Netherlands has is that the **incidents or events are usually dealt with by the authorities operating at that level** (such as safety regions, the municipality or the water authority and organisations). Depending on the nature and scope of the event, several organisations may be deployed. There is a clear division of responsibility and such clarity could benefit the Estonian crisis management system as well.

Another good practice which the Netherlands has is that **the safety regions are largely financed by the municipalities from the Municipalities Fund**. Since most of the funding is done by the municipalities, there is a need for only some additional contribution by the central government. Estonia currently has no regional government level. If Estonia sees a need to establish a regional level for crisis management, its financing could potentially also be driven from the municipalities.

3 Catalogue of requirements for crisis management

3.1 Methodology of the requirement identification and analysis

During Deliverable 2.1, the main constraints of the current ongoing risk management system were mapped and written down. The complete list of the constraints can be found below (Appendices). This list was used to perform a gap analysis on what is currently missing from the system and what could benefit the end users.

The list of the necessary requirements for the new crisis management system was made in collaboration with the different government stakeholders and the Beneficiary. The initial requirements and wish lists for the new risk mapping tool functionality were mapped already during the first interviews which were conducted during the composition of Deliverable 2.1.

Three country practices were analysed in order to enrich the new vision of the Estonian risk and crisis management process. Various good practice elements from these countries were translated into specific functional requirements of the tools to be developed.

After writing down the initial list of requirements a smaller workshop was held with the most relevant stakeholders and selected ultimate end users on the local municipality side. The participants of the smaller workshop were three selected local municipalities (Tartu, Tallinn and Alutaguse), the Estonian Rescue Board and the Ministry of Finance. During the workshop the initial requirements were validated and amended.

Technical requirements tend to be relatively general and unanimous for the state mandated systems. Therefore, there is no additional value for mapping them with regards to the municipalities' tool. However, the more generic requirements (such as accessibility, safety, usability, documentation, reliability, performance) are mapped in Deliverable 1.2.

3.2 Catalogue of requirements

The summary of the requirements is included below in two sections – general requirements and tool specific functional requirements.

Table 13. Crisis management methodology – general requirements

Name of the requirement	Short description	Category	Relative urgency	Importance for the Beneficiary
No unnecessary bureaucracy	The new methodology should be applied by the local municipality themselves (the thought process is as important as the final result) and its implementation should not result in outsourcing the completion of risk assessment to the third party producing a generic risk analysis document.	Governance	N/A	Medium
Output reusable by other institutions/levels	The output format of the risk assessment should be usable also for the regional/national risk assessments and by other directly impacted stakeholders such as the RB.	Governance	N/A	Medium

Name of the requirement	Short description	Category	Relative urgency	Importance for the Beneficiary
Methodology that focuses on the existing competence	The methodology must be understandable to and executable by all 79 local municipalities, considering the current limited risk management competences in some local municipalities.	Operational	N/A	High
Transferable know-how	The risk awareness know-how must be easily transferable within the local government even if the members of the local government change.	Operational	N/A	Medium
Simplicity of the user interface	The user interface of the system must be intuitive and no extensive user training should be required from system usage perspective.	Technical	N/A	Medium
Dynamic content	No static information should be transferred into the tool – the system should have links to the relevant data sources and no copies of static data.	Technical	N/A	Low
Data accessibility	Only the data available to the local municipality can be used in the methodology.	Legal	N/A	High
No new IT systems to be developed	The methodology/tool should be integrated into an already existing platform(s).	Technical	N/A	Medium
Data privacy	Setting different access rights and/or level of publication of the risk assessment results must be possible.	Legal	N/A	Medium
Clear methodology and tool/platform owner(s) are established	Both methodology and tool/platform owners must be appointed. Methodology owner must update the methodology whenever necessary in order to keep it relevant. Tool/platform owner(s) must provide necessary upkeep and technical support if needed.	Governance	High	High
Implementation enforcement	The usage of the tool should not be mandatory per legislation but rather strongly supported and driven by the RB representatives within the local crisis committees.	Governance	N/A	N/A

Table 14. Crisis management methodology – tool-specific functional requirements

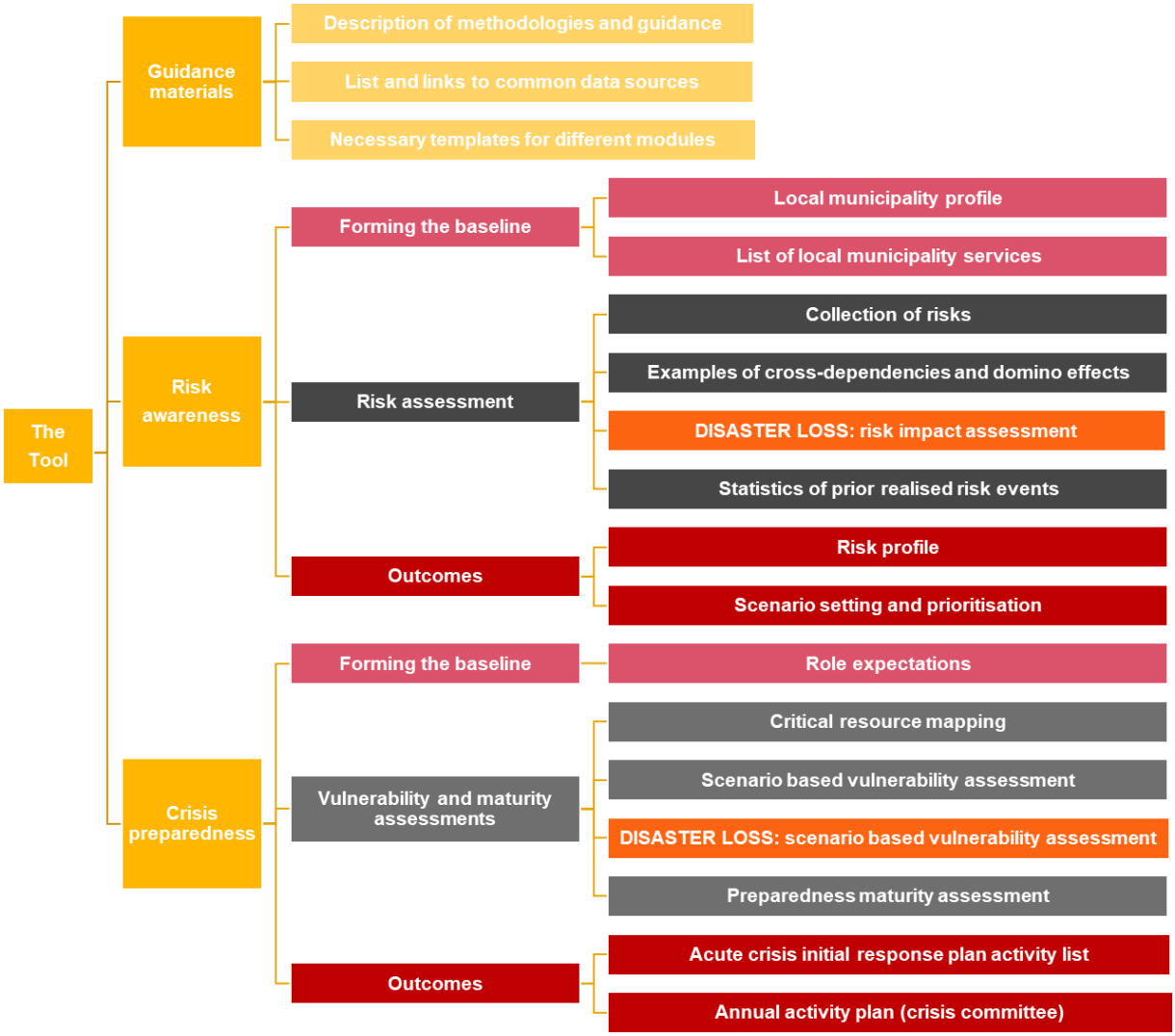
Name of the requirement	Short description	Category	Relative urgency	Importance for the Beneficiary
Coverage of both risk	The tool should be divided into two sections: one section is	Functional	Medium	Medium

Name of the requirement	Short description	Category	Relative urgency	Importance for the Beneficiary
awareness and crisis response areas	aiming to increase the risk awareness and another section is helping municipalities to increase crisis preparedness.			
Necessary guidance	The tool must be accompanied with the simple guidance and user manual.	Functional	High	High
Easy navigation to data and other related materials	The tool should list up and provide an easy access (via links) to the basic data sources and other national guidance materials.	Functional	Low	Medium
Context setting	The tool should standardise the creation of a brief local municipality's profile (recommendation for data elements what the local municipalities should know about its geography, population and services) and list up the services which the local municipalities offer, including an assessment of a service criticality from the risk/crisis perspective.	Functional	Medium	Medium
Required risk awareness elements	The tool should incorporate information necessary for the assessing of the risk likelihood (e.g. statistical information about past occurred risk events in the region) and risk impact (understanding of the cross-dependencies and wider risk impacts based on the illustrative examples).	Functional	High	High
Required crisis preparedness elements	The tool should incorporate information (templates) for the information that local municipality must gather in preparing for the potential crises (e.g. critical assets, necessary contacts) and help to assess which areas of crisis preparedness need the improvement (e.g. maturity assessment).	Functional	High	High
Risk awareness module: Collection of baseline risks	The tool should define a list of the potential risks the municipality should be aware of. Functionality must exist also to add additional municipality's specific risks.	Functional	Medium	Medium
Risk awareness module: Understanding the risk impact	Examples of different cross-dependencies between risks and services (including the vital services and local municipalities' own services).	Functional	Medium	Medium

Name of the requirement	Short description	Category	Relative urgency	Importance for the Beneficiary
Risk awareness module: Understanding the risk probability	References and sources of the information on the prior frequency of risk events.	Functional	Medium	Medium
Risk awareness module: Outcomes	The risk awareness module should allow local municipality to compose standardised simple risk profile and prioritise/select key risk scenarios for the further vulnerability assessment.	Functional	High	High
Crisis preparedness module: Role expectations	Clear boundaries on who is responsible for what in a crisis, who is leading the different type (and magnitude) of crisis and what is the specific expected role of the local municipalities (pre-; during and post-crises phases) even in case the leadership/co-ordination is done by the responsible national agency.	Functional	High	High
Crisis preparedness module: Critical resource mapping	Guidance and examples on how to map both critical material and personnel resources that may be needed for fast deployment in a crisis event.	Functional	Medium	Medium
Crisis preparedness module: Vulnerability assessment	Easily fillable selected risk scenario vulnerability assessment template. The assessment should push local municipalities to think through their actual preparedness and action plan to the specific risk scenario.	Functional	Medium	Medium
Crisis preparedness module: Maturity assessment	Easily fillable crises preparedness maturity assessment checklist covering various preparedness categories. The assessment should yield suggestions for the local municipality on which general areas and how to improve first.	Functional	Medium	Medium
Crisis preparedness module: Outcomes	The crises preparedness module should integrate the template for documenting the assessment results in a crisis committee annual work plan and guide the local municipality to think through and document the main initial response actions by roles and timing to acute crises event in selected risk scenarios.	Functional	High	High

In general, the preliminary set-up of the potential risk and crisis management tool can be visualised as follows:

Figure 18. Local municipalities' preliminary set-up of the risk assessment tool



It should be noted that the two modules highlighted in orange and denoted as DISASTER LOSS represent the functionalities expected from the disaster loss data methodology. These modules are not a part of the local municipality's crisis management methodology, but they are heavily linked to the overall risk management process and it makes sense to build the functionality into one technical solution.

4 Catalogue of requirements for the disaster loss data management

4.1 Methodology of the requirement identification and analysis

As Estonia does not currently have a disaster loss accounting system,a vision for the use of the system should first be established. Following the discussions with numerous crisis management practitioners of different levels of the Estonian crisis management system, the methodology should support the following tasks:

- post-event analysis of the cost/impact of the risk event – disaster loss accounting;
- pre-emptive analysis of the potential impacts of risk events – disaster risk modelling;
- data-driven policy making, designing preventative measures and uplifting the response capability – disaster risk management.

The initial premise was that the wider disaster loss should be measured, monitored and reported by the central institution in the crisis management system (such as the GO, which is responsible for the broader policy design in crisis management). However, after the further analysis and foreign practice review results, we concluded that the methodology needs to be universal and applicable to the numerous risk and crisis events, majority of which do not have a cross-sectoral and cross-regional effect. All such risk impacts and losses are assessed and managed by the responsible agencies. Similarly, the preventive measures and response capacities are applied by these agencies or occasionally by the local authorities in the risk area.

Based on the foreign practice review, it is evident that the disaster loss methodology is not an independent methodology. Rather, this is a tool in the wider risk assessment process that would help to include more data into the analysis. Therefore, the functionalities for the disaster loss methodology do not include technical requirements.

4.2 Catalogue of requirements

The summary of the requirements is included below. General requirements similar to that of local municipality's crisis methodology are not repeated and only the disaster loss specific requirements are presented. Note that in some areas the context of the two methodologies is different – local municipality's crisis management methodology will be built on the existing data, but the disaster loss methodology requires the initiation of collection of some critical missing data elements. Thus, the ownership and further development of the disaster loss methodology is even more critical.

The summary of the requirements is included below in three sections: general requirements, tool specific functional requirements and potential use-case requirements of the disaster loss data outputs.

Table 15. Disaster loss methodology – general requirements

Name of the requirement	Short description	Category	Relative urgency	Importance for the Beneficiary
Methodology owner	Methodology owner must update the specific disaster loss methodology whenever necessary to keep it relevant and assure continuous testing and improvement. If the tool is	Governance	N/A	Medium

Name of the requirement	Short description	Category	Relative urgency	Importance for the Beneficiary
	used in the numerous state agencies, this person should collect feedback and be responsible for the cross-sectoral development of the methodology (and necessary data collection initiation where applicable).			
Clear user profiles should be established	There are different roles that need to be carried out by the users to keep the tool relevant: 1) Information managers – their task is to assure that the relevant information attributes needed have relevant data links. This includes collecting and updating the data links. 2) Risk analysts – these users need to be able to use the data for calculating the potential impact of the risk event they are responsible for. In case of cross-sectoral events, they should have the required access rights. 3) Policy analysis - using the tool for policy design, selecting relevant measures. These users should have access to the results of the initial risk analysis calculation and have a possibility to filter preparedness levels and evaluate the impact of increasing or decreasing preparedness levels.	Governance	Low	Low
Co-operation	The methodology should require the methodology owner to call for the regular cross-sectoral discussions and co-development of the methodology as well as co-ordinate the disaster loss assessments with other agencies in case where cross-sectoral impacts are material.	Governance	N/A	High
Data needs	The methodology should highlight what kind of data attributes are needed for the disaster loss calculation, who should collect the data, how should the data be structured and how often should it be updated. Especially relevant for the data that is currently not systematically collected.	Governance/ Operational	Medium	Medium
Data perspective	Data for the crisis management needs a clear steady-state comparison in order to be effective. A good system needs	Operational	Medium	Medium

Name of the requirement	Short description	Category	Relative urgency	Importance for the Beneficiary
	to be able to produce data in context, in other words, how the data is being observed during the crisis compared to the picture outside of a crisis or to the characteristics of the area affected.			
Cross-sectoral data sharing	To evaluate cross-sectoral impacts the users should have the access to the cross-sectoral relevant data, especially in crisis situation where ad hoc specific data may be required.	Legal	N/A	Medium
Universality	The methodological framework should be applicable for the incidents (for an organisation), regional crisis or national emergencies.	Operational	High	High
Filters for events	The system should filter out which crisis events should be measured at the government level (cross-sectoral national view) and which should stay at the authority level; it should also filter out whether an event is a crisis or an incident.	Operational	Low	Low

Table 16. Disaster loss methodology – tool specific functional requirements

Name of the requirement	Short description	Category	Relative urgency	Importance for the Beneficiary
Risk event areas	Calculation of the disaster loss must be content-specific (e.g. location, timeframe). For each risk event the methodology should use the potential risk areas, where the risk events are either more likely to happen or where the consequences would be more extensive.	Functional	Low	Low
Human loss methodology	The methodology should give an overview of attributes that make up the human loss component of the disaster loss (dead, injured and relocated people). Value of life shall not be converted to monetary values but, where applicable, healthcare and/or social care costs may be taken into account in the economic loss assessment.	Functional	High	High
Damage methodology	The methodology should give an overview of attributes that make up the damage component of the disaster loss	Functional	High	High

	(infrastructure, inventories, livestock, etc.).			
Economic loss methodology	The methodology should give an overview of attributes that make up the economic loss component of the disaster loss (lost profit or gross value added, lost time value, etc.).	Functional	High	High
Disaster loss data	The methodology should provide an approach (with examples) on how to calculate a disaster loss impact and provide either respective data linked from the original source, or link/guidance to acquiring/estimating the relevant data (if data currently is non-existent).	Functional	Medium	Medium
Loss calculation	The methodology should allow to calculate the disaster loss per event in each of the three loss categories.	Functional	High	High

Table 17. Disaster loss methodology – next steps where the disaster loss data output can be converted into the valuable information

Name of the requirement	Short description	Category	Relative urgency	Importance for the Beneficiary
Specific reasonable worst-case scenario	For each risk event type and risk area the methodology should list potential worst-case scenarios and the further vulnerability assessment should be based on this. The worst-case scenarios need to find a balance between the generalisation and keeping in mind the specific requirements of the certain events.	Functional	Medium	Medium
Mapping of vulnerabilities	For each risk area/scenario, potential vulnerabilities, critical assets and many more should be mapped. These include people, businesses, resources (buildings, infrastructure, natural environment, etc).	Functional	Medium	Medium
Maturity assessment	The tool should provide an opportunity to assess the response magnitude and compare the situation with the improved or reduced maturity situation (to illustrate the value of the increased maturity). The tool should provide the support (with data and technology) to calculate the impact of	Functional	Medium	Medium

	increased or decreased maturity.

5 Appendices

Appendix 1. Ireland: Pre-nominated Lead Agencies for Different Categories of Emergency[87]

Emergency Incident Type	Initial Pre-nominated Lead Agency	Likely Change
Road Traffic Accident	An Garda Síochána	
Fire	Local Authority	
Hazardous Materials	Local Authority	
Train Crash	Local Authority	To An Garda Síochána when rescue phase complete
Aircraft Incident	Local Authority	To An Garda Síochána when fire–fighting/rescue phase complete
Rescue	Local Authority	
Weather Related	Local Authority	
Biological Incident	Health Services	
Open Country Search and Rescue (Lowland)	An Garda Síochána	
Open Country Search and Rescue (Mountain)	An Garda Síochána	
Public Order/Crowd Events	An Garda Síochána	
CCBRN Conventional Chemical Biological Radiological Nuclear	An Garda Síochána	 Local Authority Health Service Executive Local Authority Local Authority
Accidental Explosions/ Building Collapse	Local Authority	To An Garda Síochána to investigate when search and rescue complete
Environmental/Pollution	Local Authority	
Marine Emergency Impacting On-Shore	Local Authority	
Water Rescue Inland	An Garda Síochána	

[87] *Reference: A Framework for Major Emergency Management. Appendices, page 33*

Appendix 2.Ireland: Roles and Responsibilities of Lead and Support Government Departments/Agencies[88]

No	Emergency/Incident Type	Lead Government Department (LGD)	Principal Support (Bold) & Other Support Roles	Remarks
1	**Infectious Diseases (Animal)** e.g. Foot and Mouth Disease (FMD), Avian Influenza, other 'exotic' diseases	**DAFM**	**DF (DOD)** **HSE (See Remarks) CD (DOD)** Other Support Roles: Local Authorities (DHPLG) AGS (DJE) DFAT DTTS IRCG/MSO/Shipping	HSE role relates to zoonotic diseases; infectious animal diseases with a human health dimension.
2	**Contamination of Animal Feedstuffs**	**DAFM**	**Incident dependent: FSAI (DAFM)** **DH** **EPA (DCCAE)** **Revenue (Customs)** Other Support Roles: Teagasc State Laboratory (D Fin)	The principal support roles are "incident dependent". This also applies to many other emergency/incident types and would be a matter for the LGD to decide.
3	**Food safety incidents in food processing plants**	**DAFM** **and/or DH** *(Depending on the incident type.)*	**FSAI (DAFM)** Other Support Roles: HSE (DH)	The lead between DAFM and DH would be dependent upon the incident type and needs to be clarified between the two LGDs on a case-by-case basis.
4	**Tsunami - Monitoring and Warning**	**DCCAE**	**GSI (DCCAE)** **Local Authorities (DHPLG) AGS (DJE)** **HSE (DH)** **Met Éireann (DHPLG) IRCG (DTTS)** **DIAS** Other Support Roles: DTTS DFAT OPW (DPER)	Local Authority is the Lead Agency as per Framework for Major Emergency Management for coordination of onshore response. DIAS has a seismographic monitoring role.

[88] *Strategic Emergency Management National Structures and Framework, pages 39-54, https://assets.gov.ie/90681/71eaf4b4-3c20-488d-b443-620e57a51c2b.pdf*

No	Emergency/Incident Type	Lead Government Department (LGD)	Principal Support (Bold) & Other Support Roles	Remarks
5	**Earthquake – Monitoring & Warning**	**DCCAE**	**GSI (DCCAE)** **Local Authority (DHPLG) AGS (DJE)** **HSE (DH) DIAS** Other Support Roles: DFAT DTTS IRCG	Principal responders would be lead agencies as per Framework for Major Emergency Management for responding to earthquake impact. DIAS has a seismographic monitoring role
6	**Communications Services Emergency**	**DCCAE**	**CSIRT-IE (DCCAE)IDC on Cyber Security COMREGDF (DOD)**Other Support Roles:System operators, users, providers.	
7	**Network Information Systems Incident**	**DCCAE**	**CSIRT-IE (DCCAE)** **IDC on Cyber Security GCIO (DPER)** **AGS (DJE) COMREG DF (DOD)** Other Support Roles: DBEI Systems operators, users, providers.	
8	**Broadcasting Services Emergency**	**DCCAE**	**BAI RTE** Other Support Roles: Systems operators, users, providers. Other Broadcasters (TV & Radio)	
9	**Energy Supply Emergency** (Electricity/ Gas)	**DCCAE**	**CER ESB-N** **EIRGRID** **GAS Networks Ireland** Other Support Roles: DF (DOD) Systems operators, users, providers.	Potentially all Government Departments/Agencies may be affected and involved, particularly because of Ireland's high reliance on natural gas for the generation of electricity.

No	Emergency/Incident Type	Lead Government Department (LGD)	Principal Support (Bold) & Other Support Roles	Remarks
10	**Oil Supply Emergency**	**DCCAE**	**NORA** **Irish Oil Supply Industry DTTS, DHPLG, DJE** Other Support Roles: AGS (DJE) DF (DOD) Local Authorities Systems operators, users, providers.	Potentially all Government Departments/Agencies may be affected and involved, because of the potential widespread impact of an oil supply emergency.
11	**Nuclear Accidents/Incidents/Events Abroad** *(as described in National Emergency Plan for Nuclear Accidents (NEPNA))*	**DHPLG**	**EPA (DCCAE)** **DAFM, DH, DCCAE, DOD, DOT, DFAT, DFIN, DTTS** **Revenue Commissioners AGS (DJE)** **Local Authorities HSE (DH)** **Met Éireann (DHPLG) IRCG (DTTS)** **FSAI (DAFM) CD (DOD) DF (DOD)** **RTE and Commercial Broadcasters TEAGASC (DAFM)**	
12	**Incidents Involving Hazardous Materials** *(Including in transit)*[11]	**DHPLG,** OR **DTTS** *(If at Sea)*	**Local Authorities (DHPLG) HSA (DBEI)** **AGS (DJE), HSE (DH), DJE, DTTS,** **IRCG (DTTS)** *(Marine incidents)* Other Support Roles: DBEI DF (DOD) Site/vehicle/material owners Harbour Masters/Port Authorities National Poisons Information Centre Laboratories	Local Authorities are the Lead Agency as per Framework for Major Emergency Management. DJE is the lead Department and AGS is the lead Agency (regardless of the agent) where terrorist/malign involvement is suspected, sometimes referred to as a Malign CBRN incident. Likely handover to Local Authority (Chem., Rad) or HSE (Bio) if it transpires that there is no terrorist involvement. Should the incident occur at sea, the lead may pass to DTTS. The LGD for this Emergency/Incident type is currently the subject of discussion between the Department of Housing, Planning and Local Government and the Department of Business, Enterprise and Innovation.

No	Emergency/Incident Type	Lead Government Department (LGD)	Principal Support (Bold) & Other Support Roles	Remarks
13	**Radioactive Contamination – Local** *(e.g. spillages, dispersal of material – including in transit. Malign CBRN Types are addressed by No. 50 below.)*	**DHPLG**	**Local Authorities (DHPLG) EPA (DCCAE)** Other Support Roles: AGS (DJE) HSE (DH) DAFM DCCAE DF & CD (DOD) FSAI (DAFM) DOT HSA (DBEI) IRCG (DTTS)	DJE is the lead Department and AGS is the lead Agency (regardless of the agent) where terrorist/malign involvement is suspected, sometimes referred to as a Malign CBRN incident. Under the Framework for Major Emergency Management, Local Authorities would have a lead role in the Recovery Phase locally. The EPA would have a support role in the Recovery Phase of such an emergency that may last a number of years following such contamination.
14	**Environmental Pollution**	**DHPLG** OR **DTTS** **(If at Sea)**	**Local Authority (DHPLG) EPA (DCCAE)** **DAFM HSE (DH)** **OPW (DPER)** **IRCG (DTTS) (Marine incidents)** Other Support Roles: OPW (DPER) DF (DOD)	Local Authority Lead Agency as per Framework for Major Emergency Management. Should the incident occur at sea, the lead may pass to DTTS and IRCG
15	**Severe Weather** *(Severe Weather may need to be defined and further broken down into component parts, such as:* *Storms/High Winds* *Thunder/Lighting Flooding* *Snow/Ice* *Low/High Temperatures Drought* *Coastal Erosion)*	**DHPLG**	**Local Authority (DHPLG)** **AGS (DJE) HSE (DH) DJE** **Met Éireann (DHPLG) CD (DOD)** Other Support Roles: DF (DOD), DCCAE, EPA (DCCAE) TII (DTTS), DAFM, IRCG (DTTS) OPW (DPER), DEASP, DRCD	Local Authority Lead Agency as per Framework for Major Emergency Management. IRCG also has statutory powers re movement of shipping in and out of harbours & anchorages during severe weather. DEASP has a Support Role under Humanitarian Assistance Scheme

No	Emergency/Incident Type	Lead Government Department (LGD)	Principal Support (Bold) & Other Support Roles	Remarks
16	**Flooding** *(Includes: Flooding from rivers, coastal and groundwater.)*	**DHPLG**	**Local Authorities HSE (DH)** **AGS (DJE) OPW (DPER)** **Met Éireann (DHPLG) EPA (DCCAE)** **DAFM** **CD (DOD) DEASP** **D/Finance ESB** Other Support Roles: Coillte (DAFM) Waterways Ireland Irish Water DF (DOD) IRCG (DTTS)	Local Authority Lead Agency as per Framework for Major Emergency Management. OPW is responsible per Government Decision (September 2004) in respect of flood risk identification, mitigation and awareness**.** *(Ref Govt Decision S180/20/10/0996).* Note: OPW agreed to transfer the functions and responsibilities in relation to coastal protection and coastal flooding on 1 January 2009 from DAFM. DEASP Support Role under Humanitarian Assistance Scheme.
17	**Major impacts on water services, quality, infrastructure or supplies** *(Link to No 49 below.)*	**DHPLG**	**HSE (DH) EPA (DCCAE)** **Local Authorities Irish Water**	Statutory role and responsibility of Irish Water introduced since 1st January 2014.
18	**Fire**	**DHPLG**	**Local Authorities and Fire Service** **AGS (DJE) HSE (DH)** **Coillte (DAFM) CD (DOD)** Other Support Roles: DF (DOD)	Local Authority Lead Agency as per Framework for Major Emergency Management.
19	**Landslide Response**	**DHPLG**	**Local Authority AGS (DJE)** **HSE (DH) GSI (DCCAE)** Other Support Roles: DF (DOD)	
20	**Building Collapse/Accidental Explosions**	**DHPLG**	**Local Authority AGS (DJE)** **HSE (DH) HSA (DBEI)** Other Support Roles: DF (DOD)	Local Authority Lead Agency as per Framework for Major Emergency Management with likely handover to AGS when rescue phase completed.
21	**Payments Systems Emergencies**	**DFIN**	**Central Bank Financial Regulator NTMA DBEI** **AGS (DJE)**	D/Finance to confirm scope and roles.

No	Emergency/Incident Type	Lead Government Department (LGD)	Principal Support (Bold) & Other Support Roles	Remarks
22	**Any Emergency Overseas, affecting Irish Citizens.**	**DFAT**	**Incident dependent:** **DOT (GIS) DJE (AGS) HSE (DH)** Other Support Roles: Consular Services of EU Member States & other Partners. DF (DOD)	
23	**Emergency incidents requiring humanitarian assistance in disaster management (Outwards)**	**DFAT18**	**Incident dependent:** **DHPLG NGOs** **Other Support Roles:** **Consular Services of EU Member States & other Partners.** **DF (DOD)**	Where Irish Aid provides humanitarian assistance and responds to international requests.
24	**Emergency Incidents requiring humanitarian assistance in disaster management (Inwards) (Trigger Mechanisms for EU Host Nation Support, the EU Solidarity Clause, the Integrated Political Crisis Response (IPCR) arrangements and other International support mechanisms were they need to be addressed.)**	**Incident Dependent. Lead Department may vary depending on the type of incident.**	**Incident dependent. Lead Department and DFAT (EU Division, D/Taoiseach may provide support regarding EU Solidarity Clause and the IPCR)**	DFAT will provide a supporting role in facilitating international contacts where appropriate. The EU Civil Protection (Emergency Response Coordination Centre) mechanisms may also apply.

No	Emergency/Incident Type	Lead Government Department (LGD)	Principal Support (Bold) & Other Support Roles	Remarks
25	**Biological Incident**	**DH**	**HSE (DH)** **Potentially all Government Departments/Agencies may be affected and involved.** **Other Support Roles: Local Authority DHPLG AGS (DJE) DF (DOD)** **DJE (See remarks) Regional Laboratories Universities**	HSE Lead Agency as per Framework for Major Emergency Management. DH will act as LGD where the incident is primarily a public health emergency. DJE is the lead Department and AGS is the lead Agency (regardless of the agent) where terrorist/malign involvement is suspected, sometimes referred to as a Malign CBRN incident The initial assumption, and subsequent changes in lead and supporting roles, both at agency and parent department level, will be subject to the assessment of evolving indicators and will be agreed under the procedures laid down in the Framework for Major Emergency Management.
26	**Pandemic Influenza and Other Public Health Emergencies**	**DH**	**HSE** *(All members of the Health Threats Coordination Committee)* Other Support Roles: Local Authorities (DHPLG) CD (DOD) Revenue Commissioners FSAI[19] (DAFM)	Potentially all Government Departments/Agencies may be affected and involved, because of the potential widespread impact of a pandemic or other Public Health Emergencies.
27	**Emergencies involving Explosive Ordnance** *(Conventional or otherwise and regardless of provenance)*	**DJE**	**AGS** **DF (DOD)** Other Support Roles: Government Inspector of Explosives Local Authority (DHPLG) HSE (DH) IRCG (DTTS) (Marine Incidents)	
28	**National Security Related Incidents** *(Including terrorism)*	**DJE**	**AGS (DJE)** Other Support Roles: DHPLG DF (DOD) HSE (DH) Local Authority (DHPLG) DTTS (incl. IRCG) DFAT	DJE's lead role is incident dependent.

No	Emergency/Incident Type	Lead Government Department (LGD)	Principal Support (Bold) & Other Support Roles	Remarks
29	**Incidents Requiring Water Rescue Inland**	**DJE**	**IRCG (DTTS) AGS (DJE)** Other Support Roles: HSE (DH) Waterways Ireland Local Authority (DHPLG) DTTS RNLI CD (DOD) DF (DOD)[21]	AGS Lead Agency as per Framework for Major Emergency Management for initial coordination, with likely handover following consultation with IRCG. In the Recovery Phase, AGS has a role in the investigation of an incident where appropriate.
30	**Public Order/Crowd Events** *(Including sports grounds emergencies)*	**DJE**	**AGS (DJE) DF (DOD)** Local Authority (DHPLG) HSE (DH) Other Support Roles: DTTS	AGS lead agency as per Framework for Major Emergency Management. In the Recovery Phase, AGS has a role in the investigation of an incident where appropriate.
31	**Emergencies Abroad with the result of mass inward population displacement**	**DJE**	**HSE (DH)** **Local Authority (DHPLG) DFAT** **Revenue (Customs) DF (DOD)** Other Support Roles: CD (DOD) Red Cross & NGO's DEASP	DEASP – Support role in administration of Direct Provision Allowance on behalf DJE to persons resident in the Direct Provision accommodation system DEASP – support in administration of SWA in appropriate cases
32	**Convening Cabinet in the event of an Emergency requiring Government Meeting**	**DOT**	**DOT, GPO, GIS and LGDs** Other Support Roles: Lead/ support departments & agencies in the emergency GTF	Lead is Incident dependent.
33	**Aircraft Accident**	**DTTS**	**Local Authority IAA (ATC)** **Airport Authorities AGS (DJE)** **IRCG HSE (DH)** **DOD (DF) DTTS & AAIU** Other Support Roles: Airlines CD (DOD) HSA	Local Authority Lead Agency per Framework for Major Emergency Management, with likely handover to AGS when firefighting/rescue complete.

No	Emergency/Incident Type	Lead Government Department (LGD)	Principal Support (Bold) & Other Support Roles	Remarks
34	**Emergency Incidents at Airports**	**DTTS**	**IAA (ATC)** **Airport Authorities Local Authority (DHPLG)** **AGS (DJE)** **HSE (DH)** Other Support Roles: Airlines DF (DOD) HSA CD (DOD) IRCG (DTTS) DTTS (AAIU)	
35	**Aviation Security/Terrorist Incident** *(Actual or attempted hijacking or other terrorist activity at an Irish airport or in Irish airspace.)*	**DTTS**	**DJE** **AGS (DJE) DF (DOD)** **Airport Authorities** Other Support Roles: Local Authority (DHPLG) HSE (DH) Airlines IAA	
36	**Railway Accident**	**DTTS**	**Commission for Railway Regulation (CRR)/Chief Investigator** **Local Authority (DHPLG) AGS (DJE)** **HSE (DH)** Other Support Roles: DF (DOD) CD (DOD) HSA Rail Systems Operators IRCG (DTTS)	Local Authority Lead Agency as per Framework for Major Emergency Management with likely handover to AGS when rescue phase complete.
37	**Major Accident on National & Non- national Roads and/or Infrastructure** *(incl. bridges, tunnels etc)*	**DTTS**	**AGS** **HSE (DH)** **Local Authority (DHPLG)** Other Support Roles: DF (DOD) CD (DOD) IRCG (DTTS) TII (DTTS)	AGS Lead Agency as per Framework for Major Emergency Management (except when hazardous materials are involved, the local authority is the lead agency).

No	Emergency/Incident Type	Lead Government Department (LGD)	Principal Support (Bold) & Other Support Roles	Remarks
38	**Incidents Requiring Marine Search and Rescue**	**DTTS**	**IRCG (DTTS)** Other Support Roles: DCCAE HSE (DH) CD (DOD) Harbour Masters & Port Authorities Commissioner for Irish Lights RNLI DF (DOD)	
39	**Ferry and Other Shipping Incidents**	**DTTS**	**IRCG (DTTS) DCCAE** **HSE (DH) AGS (DJE)** Other Support Roles: DCHG DRCD Local Authorities (DHPLG) Harbour Masters & Port Authorities DFAT RNLI DF (DOD)	
40	**Marine and Coastal Pollution**	**DTTS**	**IRCG (DTTS)** **Local Authorities (DHPLG) DCCAE** **DF (DOD)** Other Support Roles: Commissioners for Irish Lights Harbour Masters & Port Authorities	
41	**Marine Emergency Impacting On-shore**	**DTTS**	**IRCG (DTTS)** **Local Authorities (DHPLG) DF (DOD)** Other Support Roles: Commissioners for Irish Lights Harbour Masters & Port Authorities DCCAE CD (DOD) AGS (DJE) HSE (DH)	Local Authority Lead Agency per Framework for Major Emergency Management for coordination of on-shore response

No	Emergency/Incident Type	Lead Government Department (LGD)	Principal Support (Bold) & Other Support Roles	Remarks
42	**Severe Space Weather Events** *(Primarily impacting on power and communications transmission, GPS and Satellite services.)*	**DCCAE** Incident Dependent. Lead Department may vary depending on the effect of such events.	**DCCAE** **COMMUNICATIONS: CSIRT-IE (DCCAE)** **IDC on Cyber Security GCIO (DPER)** **AGS (DJE) COMREG** **Financial Services POWER:** **CER** **ESB, EIRGRID, Gas Network Ireland** Other Support Roles: DBEI, Financial Services, GSI.	Lead may be incident dependent as it depends on the severity and impact of such events but is currently high on the UK National Risk Register.
43	**Volcanic eruptions impacting on Ireland** *This scenario may evolve from a DTTS lead (Aviation Impact) to another depending on the type of incident e.g.* *a. Volcanic eruptions impacting upon Air Travel. DTTS - LGD* *b. Volcanic Eruptions impacting upon Food/Water/Air Contamination (DAFM & DH - LGD)*	**DTTS** **Or** **Incident Dependent lead for DAFM, DH, HSE.**	**GSI (DCCAE) EPA (DCCAE)** **DAFM, DH, DHPLG, DBEI, DFAT, DOT** **Consumer Protection Agency Local Authorities (DHPLG) AGS (DJE)** **HSE (DH)** **Met Éireann (DHPLG) Airport Authorities** **Transport Operators IRCG (DTTS)** **MSO** Other Support Roles: DF(DOD)	Potentially all Government Departments/Agencies may be affected and involved, because of the potential widespread impact of such a scenario.
44	**Marine emergency impacting offshore, such as a fire, explosion onboard a ship or rig.**	**DTTS**	**DH, DHPLG, DBEI, DFAT, DOT IRCG (DTTS)** **DF(DOD) MSO HSE (DH) DFAT** **Local Authorities (DHPLG) DCCAE (Offshore gas & oil) AGS** Other Support Roles: Commissioners for Irish Lights Harbour Masters & Port Authorities CD (DOD) RNLI	Support roles would be incident dependent.

No	Emergency/Incident Type	Lead Government Department (LGD)	Principal Support (Bold) & Other Support Roles	Remarks
45	**Transport Hub** *(Such as Critical Infrastructures e.g. Dublin Port, Dublin Airport and Port Tunnels.)*	**DTTS**	**DH, DHPLG, DBEI, DFAT, DOT IRCG (DTTS)** **MSO DFAT** **Local Authorities (DHPLG) DCCAE** **AGS** **HSE (DH) DF (DOD) TII (DTTS)** Other Support Roles: Commissioners for Irish Lights, Harbour Masters & Port Authorities, RNLI & Transport Operators	Support roles would be incident dependent.
46	**Dam inundation due to failure or breach**	**DCCAE** **Or DHPLG** **Or OPW** **(Lead will be incident dependent).**	**Local Authorities DH, DAFM** **HSE (DH) AGS (DJE)** **OPW (DPER) (*Ref Govt Decision S180/20/10/0996)*** **Met Éireann (DHPLG) EPA (DCCAE)** **ESB** Other Support Roles: Waterways Ireland Irish Water DEASP DF & CD (DOD) IRCG (DTTS)	Local Authority Lead Agency as per Framework for Major Emergency Management. OPW is responsible per Government Decision (Sept 2004) in respect of flood risk identification, mitigation and awareness (*as per No 16 Above*) Note: OPW agreed to transfer the functions and responsibilities in relation to coastal protection and coastal flooding on 1 January 2009 from DAFM. DEASP Support Role under Humanitarian Assistance Scheme
47	**Disruptive industrial action**	**LGD will be incident dependent. Lead Department may vary depending on the impact of any particular disruption.**	Incident Dependent Lead Department may vary.	Depending upon the type of industrial action and impact, DOT and/or the Chair of the GTF would decide upon who will take the lead.

No	Emergency/Incident Type	Lead Government Department (LGD)	Principal Support (Bold) & Other Support Roles	Remarks
48	**Food contamination impacting on Public Health** *(Lead between DH and DAFM depending on the incident type and its impact – also see No. 3 above.)*	**DH and/or DAFM Lead will be incident dependent.**	**FSAI HSE EPA (DCCAE) Local Authorities**	Potentially all Government Departments/Agencies may be affected and involved, because of the potential widespread impact of such a scenario.
49	**Water Supply Contamination impacting on Public Health**	**DHPLG**	**Irish Water Local Authorities ESB OPW EPA FSAI HSE EPA CD (DOD) AGS**	Potentially all Government Departments/Agencies may be affected and involved, because of the potential widespread impact of such a scenario.
50	**Malign CBRN Incidents** *(Based upon the lead roles in the Protocol for responding to a malign CBRN (Chemical, Biological, Radiological & Nuclear) incident)*	**DJE**	**AGS DHPLG Local Authorities (DHPLG) EPA (DCCAE)** Other Support Roles: HSE (DH) DAFM DCCAE DF & CD (DOD) FSAI (DAFM) DOT HSA (DBEI) Possibly others.	The Department of Justice and Equality is the Lead Government Department and An Garda Síochána is the lead Agency in responding to a malign CBRN incident. The HSE and the Local Authority (Authorities) will play a supporting role. The Defence Forces will also provide support through its role in 'Aid to the Civil Power'. The EPA, the DoD and the DAFM may also play supporting roles, as will other agencies as required. Each Government Department/Agency will participate fully in the inter-agency coordination arrangements for the response.

Appendix 3. Ireland: Risk matrix, classification of likelihood[89]

Classification of Likelihood

Ranking	Classification	Likelihood
1	Extremely Unlikely	May occur only in exceptional circumstances; Once every 500 or more years.
2	Very Unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communicates; and / or little opportunity reason or means to occur; May occur once every 100-500 years.
3	Quite Unlikely	May occur at some time; and /or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisations worldwide; some opportunity, reason or means to occur; may occur once per 10-100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years.
5	Very Likely	Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year.

[89] *Reference: Monaghan County Council Major Emergency Plan. Monaghan County Council Risk Register 2021. Section 2: Using the Risk Matrix, page 5*

Appendix 4. Ireland: Risk matrix, classification of impact[90]

Classification of Impact

Ranking	Classification	Impact	Description
1	Minor	Life, Health, Welfare	Small number of people affected; no fatalities and a small number of minor injuries with first-aid treatment.
		Environment	No contamination, localised effects
		Infrastructure	<0.5M Euros
		Social	Minor localised disruption to community services or infrastructure
2	Limited	Life, Health, Welfare	Single fatality; limited number of people affected; a few serious injuries with hospitalisation and medical treatment required. Localised displacement of a small number of people for 6-24 hours. Personal support satisfied through local arrangements.
		Environment	Simple contamination, localised effects of short duration
		Infrastructure	0.5-3M Euros
		Social	Normal community functioning with some inconvenience.
3	Serious	Life, Health, Welfare	Significant number of people in affected area impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation. Large numbers of people displaced for 6-24 hours or possibly beyond; up to 500 evacuated. External resources required for personal support.
		Environment	Simple contamination, widespread effects or extended duration.
		Infrastructure	3-10M Euros
		Social	Community only partially functioning, some services available.
4	Very Serious	Life, Health, Welfare	5 to 50 fatalities, up to 100 serious injuries, up to 2000 evacuated

[90] *Reference: Monaghan County Council Major Emergency Plan. Monaghan County Council Risk Register 2021. Section 2: Using the Risk Matrix, page 5*

		Environment	Heavy contamination, localised effects or extended duration
		Infrastructure	10-25M Euros
		Social	Community functioning poorly, minimal services available
5	Catastrophic	Life, Health, Welfare	Large numbers of people impacted with significant numbers of fatalities (>50), injuries in the hundreds, more than 2000 evacuated.
		Environment	Very heavy contamination, widespread effects of extended duration.
		Infrastructure	>25M Euros
		Social	Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support.

Appendix 5. Ireland: Example of establishing context for risk matrix[91]

Social		
Population-major centres	**Population**	**Demography Summary**
Co. Monaghan	61,386	Disability 11.7%
		Elderly (>65yrs) 14%
Monaghan Town	7,678	Children (>18yrs) 59%
Carrickmacross	5,032	Children (12yrs – 18yrs) 8.4%
Castleblayney	3,607	Children (<12yrs) 18.6%
Clones	1,680	Non-Irish Nationals 12%
Ballybay	1,241	Based on the Census report 2016
Primary economic drivers		**Details**
Industry		Workforce 62.5% (62.3% National Average)
		Some of the major indigenous private sector companies in County Monaghan are:
		• Lakeland Dairies
		• Grove Turkeys
		• Monaghan Mushrooms
		• Combi Lift Ltd.
		• Feldhues GMBH
		• Silverhill Foods
		• Silvercrest Foods Ltd
		• AIBP Ltd
		• Kingspan Century Homes
		• Kingspan Titan

[91] *Reference: Monaghan County Council Major Emergency Plan. Monaghan County Council Risk Register 2021. Section 3: Establishing the Context, page 10*

	• Kingspan Castleblaney
	• Shabra Plastics & Packaging
	• MC Chemicals
	• Rye Valley Foods
	• Lakeland Feed mills and Drying plant
Tourism	Tourism revenue for Monaghan was €16 million. Figures from Bord Failte 2008 report
	Tourist attractions in County Monaghan are:
	• Rossmore Forest Park
	• Monaghan R+B Harvest Festival
	• Annual Patrick Kavanagh Weekend
	• Lough Muckno Water Activities
	• Sliabh Beagh Walks in Knockatallon
	• Local Golf Clubs, Rossmore and Mannon Castle
Sports Activities	Ulster Final
	St. Tiernachs Park,
	Capacity 32,000
Agriculture	Agriculture has traditionally been the dominant economic activity in County Monaghan, but currently accounts for just 13.5% of the work by industry. Personal Income from Agriculture is currently at 13.5% compared to a National rate of 5.9% and Construction at 10.7%. The County has a greater dependence on agriculture than the national rate, but it has been declining since 1996. Co. Monaghan accounts for a great percentage of the POU Processing Industry in Ireland and poultry rearing facilities a common site throughout the county.
Education	Secondary Schools
	(Approx. Numbers) Source https://www.schooldays.ie/ 2021
	St. Louis (Mon) 519
	St. Louis (Cmx) 521
	St. Marcartan (Mon) 601
	Coláiste Oiriall (Mojn) 348
	Collegiate (Mon) 261
	Beech Hill (Mon) 577

	Largy College (Clones)	411
	Patrician High School (Cmx)	474
	Inver College (CMX)	369
	Our Lady's (C'Blaney)	714
	Community College (BBAY)	353
	Castleblayney College	269

Principle Emergency Services	**Details**
An Garda Síochána	Part Of Cavan/Monaghan Division
H.S.E. (Health Service Executive)	Part of Dublin North-east Region.
	• Monaghan
	• Cavan
	• Meath
	• Monaghan
	• North Dublin
	2 acute hospitals are located at;
	• Our Lady of Lourdes, Drogheda: Capacity 340 beds.
	• Cavan General Hospital: Capacity 171 beds
	There are 2 ambulance stations within Monaghan
	• Monaghan
	• Castleblayney
	Ambulance base at Castleblayney & Ardee with 1 No. Frontline EMT serves the South Monaghan areas.
Fire Service	The County is serviced by 5 stations. There are 51 fire- fighters in the county. Each station has 9 firefighters in it with the exception of Monaghan having 15.
	Fire Stations are located at the following bases:
	• Monaghan
	• Clones
	• Castleblayney
	• Carrickmacross

	• Ballybay
	Part of North-East Region.
	• Monaghan
	• Cavan
	• Meath
	• Monaghan
	Resources for a major emergency can be called from within the region
Civil Defence	County Monaghan Civil Defence provides the following voluntary services:
	• Land Search & rescue
	• Water Search & Rescue
	• Rescue Training
	• Crowd Control
	• First Responder
	• Ambulance Duties

Environment	
Geographical Characteristics	**Details**
Area of County	1,295km^2
Forestry	• Rossmore
	• Dún na Rí Forest Park
	• Dartrey
National Heritage Sites	Clones Round Tower
Main Rivers	Blackwater
	Finn
	Glyde
	Fane

	Dromore
Mountains	Slieve Beagh
North East Region	**Population**
Cavan	71,176
Meath	195,044
Louth	128,884
	Sourced from Internet Wikipedia
Armagh	174,792
Tyrone	177,986
Fermanagh	62,527
	Sourced from Internet Wikipedia

Infrastructure		Details	
Transport types	Roads	N2	Monaghan – Dublin
		N12	Monaghan – Armagh
		N54	Monaghan – Clones
		62% of journeys are taken by car. Average commute is 23 minutes.	
		All public service transport is by road network and is operated by public and by private service providers.	
	Airport	No airport but close proximity to Dublin airport. Major flight paths running adjacent to county. Flight path will change according to weather conditions.	
Electricity Supply		Under the control of the E.S.B. 1 X 110kv power station located at Lisdrum outside Monaghan Town 8 X 38kv power stations at various other locations throughout the county Upgrades to network from 10kv to 20kv transmission lines.	
Gas Supply (Bord Gáis)		Gas is supplied by Bord Gáis to the south Monaghan town of Carrickmacross and further north to Lough Egish Food Retail Park. Bord Gáis are currently carrying out analysis of areas for further connections to the distribution main including the town of Monaghan.	
Water Supply Monaghan County Council		10 Public (Irish Water) water schemes 13 Private water schemes There are 525km of water main network within County Monaghan. 85% of County Monaghan is covered with mains water (Public & Private Group Schemes). The council also provides 24 public sewerage treatment facilities throughout the county.	
Hazardous sites	Seveso sites	No Seveso sites in Monaghan region.	
	Industrial Sites	• Kingspan holds large quantities of Pentane	
		• MC Chemicals	

		• Refrigeration Plants associated with the food industry contain ammonia as part of its cooling process.
	Bulk Petroleum Stores	• Cooltrim Oils, Lough Egish
		• Martins Fuels, Monaghan
	Quarries	Quarries require the use of explosive materials for blasting purposes thereby constituting a hazard. The local Authority is responsible for the licensing of explosive magazine stores within the county.
		Registered quarry locations are as follows:
		• Roadstone Provinces Ltd, Ballybay
		• Roadstone Provinces Ltd, Castleblaney (closed but site poses a hazard)
		• Gypsum Mines, CMX
		• Wrights Quarry, Swans cross
		• Monaghan Queries, Ardaghy Road, Monaghan

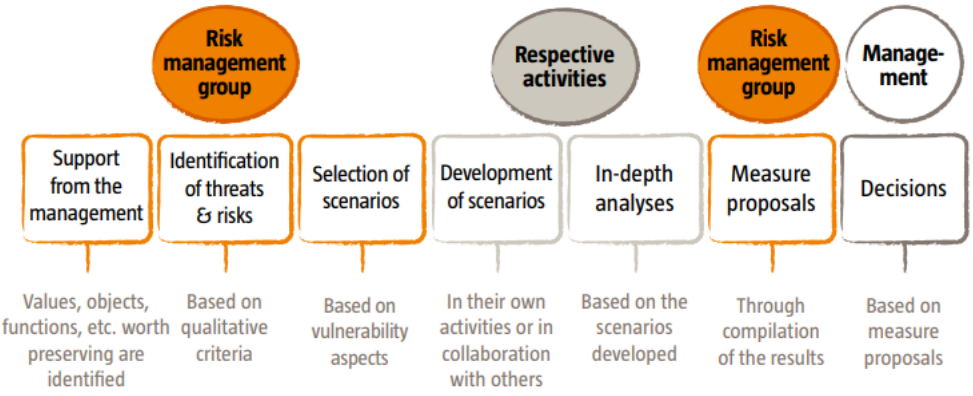
Appendix 6. Research questions for foreign practices review

Research questions	
Crisis management	
1.	Who and at which levels of public sector (national/regional government, ministries, agencies etc.) are involved in risk management and resilience building?
2.	Risks, crises, emergencies - how are these events defined? Are any border lines drawn? How does the management change when we move up the severity level from risk event to crisis to an emergency?
3.	How is risk awareness created in local municipalities? How is the process organized, including communication, training, exercises, etc.?
a.	Which authority is responsible for creating better risk awareness in municipalities?
b.	How (through what means and activities) is risk awareness created/improved in local municipalities?
4.	Who leads the local municipality's risk identification and assessment process, e.g., the local municipality itself or someone else (other state institutions, agencies)?
5.	Is the local municipality's risk assessment based on a national risk analysis? If so, are the risks assessed on a regional/local basis separately? How? If not, then what is the basis for the municipality risk assessment – where do they start from?
6.	Is there a central risk map (with predefined threats/risks) given to the local municipalities centrally, and if so, what threats does it include?

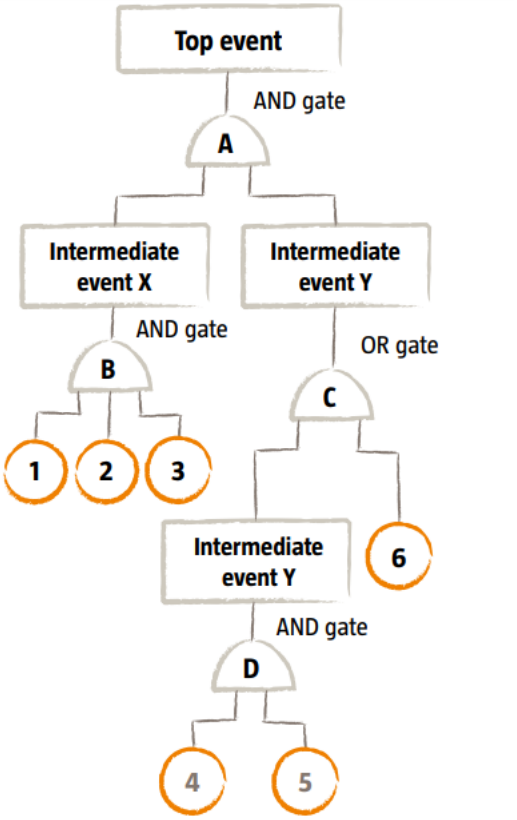
7.	Which risk assessment methodology is used by the local municipality in the selected country?	
	a.	Which methodologies are used for assessing the probability and impact (or the methodology is different from standard probability/impact assessment in its entirety)? What does the risk matrix look like? How are the risks classified? Which indicators are used for monitoring risk events? Are the target levels for red flags used, if yes, what kinds? Which risk criteria and thresholds are used?
	b.	How are the threats which may materialise in the local municipality identified and assessed?
	c.	How is data collected and obtained for local municipality risk assessment?
	d.	Who (which levels of government, state institutions, agencies) are involved in the local municipality risk assessment process – why? What is their role in the process?
	e.	How is the outcome of the local municipality's risk assessment presented, e.g., is there a consolidated/central overview of all the municipalities? If so, what does it consist of?
8.	Are the results of the local municipality's risk assessment used at the national level and how (for example, in financing, planning, etc.)?	
9.	Are the results of the local municipalities' risk assessment public, i.e. available to the public?	

Disaster loss		
10.	If and how is disaster loss quantification and data used (to what extent is it practically used)?	
11.	How is disaster loss classified/categorized? Is it human loss, direct damage, indirect economic impacts or some other categorization is applied?	
12.	Is there a central information registry/central disaster loss data management system? If so, where are all the disaster loss calculations performed and stored?	
13.	How is the disaster loss data management system organized?	
	a.	What are the roles for data management subprocesses - the government, local municipality, insurance etc.? Subprocesses: defining the data need, collecting, organising, protecting, storing, quality assuring, sharing etc.).
14.	What methodologies are used for calculating the disaster loss?	
	a.	What exact disaster loss calculation methodology is used for each type of loss (e.g. human loss, direct damage etc.), and what is the basis for the calculation, (inc. metrics, targets, criteria, thresholds)?
	b.	What data sources are used in the calculations?
	c.	If and how does disaster loss data collection and calculation differ for different risk events?

Appendix 7. Sweden: The ROSA method



Appendix 8. Sweden: Fault tree analysis



Appendix 9. Sweden: Outline of the broad analysis

BROAD ANALYSIS OUTLINE								
Identified risk/ scenario	Possible causes	Consequences	Comments	Risk evaluation	Conse-quence			Recom-mended measures
				Probability	H	M	E	
Collision train/car	• Crossing barrier out of order • Train driver did not stop on red	• Personal injuries • Material damage • Traffic jam		3	4	1	2	Flyover junctions
Derailing of liquefied petroleum car	• Substandard maintenance • Sabotage • Train driver speeding	• Explosion • BLEVE • Personal injuries • Material damage • Traffic jam		1	5	2	5	Fördjupad riskanalys krävs
Derailing of car with carbon dioxide	• Substandard maintenance • Sabotage • Train driver speeding	• Toxic gas release		2	5	3	4	More in-depth risk analysis required

Appendix 10. Sweden: Dependency matrix

- *Clear dependence:* The activity has some shock absorbers and a certain amount of stamina.

Example of a dependency matrix.

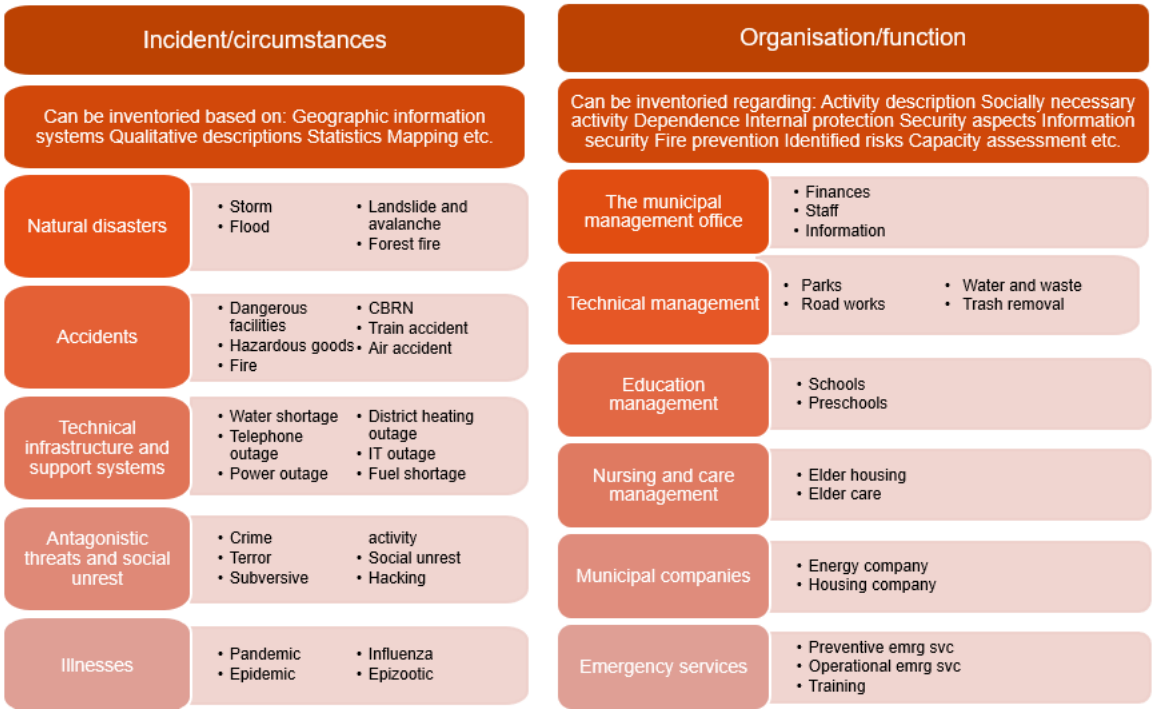
	Sewage	District heating	Electricity supply	Emergency medical care	Municipal elder care	Labour power
Sewage	–	0	0	5	5	3
District heating	0	–	0	5	5	1
Electricity supply	5	3	–	3	5	3
Emergency medical care	0	0	0	–	3	1
Municipal elder care	0	0	0	3	–	1
Labour power	3	3	3	5	5	–

Appendix 11. Sweden: The IBERO method

Preparedness evaluation for individual actor	Preparedness evaluation for several actors	Inventory of risks and resources	Reporting functions

• Assess capacity, consequences, causes, and spill over incidents	• Draw conclusions on particular events for several actors	• Inventory within the geographic area	• Make out individually tailored working reports with different intersections in order to utilise the information in IBERO effectively
• Draw conclusions on capacity, consequences, causes, and spill over incidents for individual incidents	• Draw conclusions on society's general ability to manage extraordinary incidents and prioritise among measures in order to strengthen management capacity		
• Evaluate own general ability to manage extraordinary incidents and propose measures to strengthen management capacity			

Appendix 12. Sweden: Example of the risk and vulnerability report in Sweden



Appendix 13. Sweden: Examples of disasters or crises in the Netherlands

Disasters are categorized by the Dutch government according to types of causes (typology). The central government mentions the following categories:

- Pandemics, for example caused by a flu virus;
- Failure of the internet or telephone network;
- Terrorist attacks;
- Large-scale accidents such as a plane crash or a train crash;
- Natural disasters such as floods, extreme rainfall or drought and natural fires.

The same applies to types of crises as mentioned in the National Safety Profile, but categorized by types of disruption and course:

Natural environment:
- Floods
- Natural fires
- Extreme weather conditions
- Earthquakes
- Pests
- Animal diseases

Built Environment
- Fires in vulnerable properties
- Collapse of large buildings and engineering structures

Technological environment:
- Incidents with combustible/explosive substances in the open air
- Toxic incidents in open air
- Nuclear incidents

Traffic and transport:
- Aviation incidents
- Incidents on or under water
- Traffic incidents on land
- Incidents in tunnels

Health incidents:
- Public health threat
- Disease wave

Social environment
- Panic in crowds
- Disturbance of public order

Appendix 14. Netherlands: National security interests

National security interest	Impact criteria	Most relevant Risk categories
1. Territorial security	1.1 Encroachment on Dutch territory	Floods Nuclear disasters
	1.2 Infringement of the international position of the Netherlands	Military threats Tensions within security institutions
	1.3 Infringement of digital infrastructure integrity	Natural disasters (as an example: floods) Digital sabotage Cyber espionage Unwanted foreign influence (hybrid operations) Military threats
	1.4 Encroachment on allied territory	Military threats Unwanted foreign influence (hybrid operations) Digital sabotage
2. Physical safety	2.1 Fatalities	Floods Infectious diseases (human, influenza pandemic) Animal diseases and zoonosis (Avian influenza epidemic) Chemical accidents Nuclear disasters (long-term) Transport accidents Terrorism
	2.2 Seriously injured and chronically ill	
	2.3 A lack of basic needs (physical suffering)	Disruption of critical infrastructure Floods Extreme weather Wildfires
3. Economic security	3.1 Costs	Disruption of critical infrastructure Floods Nuclear disasters Destabilisation of the financial system Trade contraction/disruption of international trade Criminal interference
	3.2 Violation of the vitality of the Dutch economy	Destabilisation of the financial system Trade contraction/disruption of international trade
4. Ecological security	4.1 Long-term violation of the natural environment	Floods Wildfire
5. Social and political stability	5.1 Disruption of daily life	Disruption of critical infrastructure Floods Human infectious diseases (influenza pandemic)

	5.2 Violation of the democratic constitutional system	Criminal interference Cyber espionage Violent extremism Non-violent extremism Subversive enclaves Unwanted foreign influence (in diaspora communities)
	5.3 Societal impact	Terrorism Pressure on security institutions (NATO, EU) Undesirable foreign influence (hybrid operations)
6. International legal order	6.1 Violation of state sovereignty, peaceful coexistence & peaceful conflict resolution (as codified in the UN charter)	Military threats CBRN proliferation Unwanted foreign influencing (hybrid operations)
	6.2 Violation of the functioning and legitimacy of or adherence to international treaties and norms on human rights	CBRN proliferation Instability on European borders Terrorism
	6.3 Violation of a rule-based international financial-economic system	Trade contraction/disruption of international trade Pressure on security institutions
	6.4 Violation of the effectiveness and legitimacy of multilateral institutions and international regimes	Unwanted foreign influence (hybrid operations) Military threats Pressure on security institutions CBRN proliferation

Appendix 15. Netherlands: Overview of themes and categories

Theme	Risk category
Threats to public health and the environment	Human infectious diseases
	Animal diseases and zoonosis
Natural disasters	Extreme weather
	Floods
	Wildfires
	Earthquakes
Disruption of critical infrastructure	Disruption of critical infrastructure
Major accidents	Nuclear disasters
	Chemical incidents

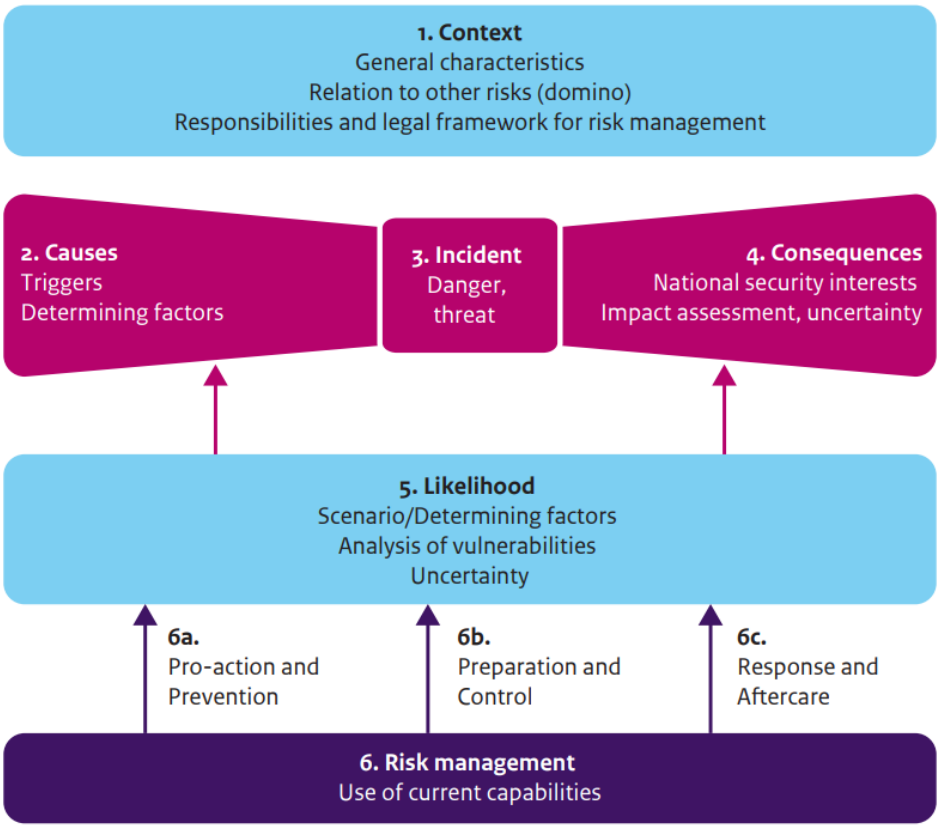
Cyber threats	Digital sabotage
	Disruption of the internet
	Cyber espionage
	Cyber crime
Subversion of the democratic system	Non-violent extremism
	Subversive crime (subversive enclaves)
	Unwanted foreign interference
	Unwanted foreign influence (hybrid operations)
Violent extremism and terrorism	Violent extremism
	Terrorism
Financial and economic threats	Criminal interference
	Threats to the hub function and supply lines of the Netherlands (flow security)
	Trade contraction/disruption of international trade
	Destabilisation of the financial system
Threats to international peace and security	Instability on European borders
	Military threats
	Proliferation of CBRN weapons
	Security arrangements under pressure (NATO, EU)

Appendix 16. Netherlands: Overview of the overlap and differences between national and regional themes.

NRP thematic classification		**Safety regions thematic classification (RRP)**	
Societal theme	**Risk category**	**Societal theme**	**Crisis type**
Natural disasters	Flood	**Natural environment**	Floods
	Extreme weather		Extreme weather conditions
	Wildfire		Wildfires
	Earthquake		Earthquakes
	Heat and drought		Extreme weather conditions
	Solar storm		Plagues
			Animal diseases

Threats to public health and the environment	Human infectious diseases	**Public health**	Epidemic
	Animal diseases and zoonoses		Threat to public health
	Environmental disasters		
	Food crises		
	Antibiotic resistance		
Major accidents	Nuclear disasters	**Technological environment**	Nuclear incidents
	Chemical accidents		Incidents with flammable/explosive substance in open air
			Incidents with toxic substance in open air
	Transport accidents	**Traffic and transport**	Aviation incidents
			Incidents on or under water
			Traffic incidents on the land
			Incidents in tunnels
		Built environment	Fires in vulnerable objects
			Collapses in large buildings and structures
Disruption of critical infrastructure	Independent disruption to critical infrastructure (power supplies, drinking water, ICT, payment transactions)	**Critical**	Disruption to power supplies
	Common causes (simultaneously)	**infrastructure and provisions**	Disruption to drinking water supply
	Cascading effects		Disruption to waste water discharge and purification
			Disruption to waste processing
			Disruption to food provision

Appendix 17. Netherlands: Schematic representation of the bow-tie model showing the various elements of the assessment per risk category



Appendix 18. Netherlands: The impact criteria

The impact criteria, related to the five national security interests	
Territorial security:	1.1 Encroachment on the territory and digital environment
	1.2 Infringement of the international position of the Netherlands
Physical safety:	2.1 Fatalities
	2.2 Seriously injured and chronically ill
	2.3 A lack of basic needs (physical suffering)
Economic security:	3.1 Costs
	3.2 Violation of the vitality of Dutch economy
Ecological security:	4.1 Long-term violation of nature (flora and fauna) and the environment
Social and political stability:	5.1 Disruption of daily life
	5.2 Violation of the democratic constitutional system 5.3 Societal impact

Appendix 19. Netherlands: Impact classification 1

Class	Example criterion: Number of fatalities	Example criterion: Violation of democratic system
Limited	Less than 10	Limited violation of the functioning of a couple of institutions
Substantial	10 to 100	Limited violation of the functioning of several institutions
Serious	100 to 1,000	Considerable violation of the functioning of several institutions and/or violation of freedoms, rights and core values
Very serious	1,000 to 10,000	Structural violation of the functioning of several institutions and freedoms, rights and core values
Catastrophic	More than 10,000	Structural violation of the functioning of institutions and freedoms, rights and core values

Appendix 20. Netherlands: Impact classification 2

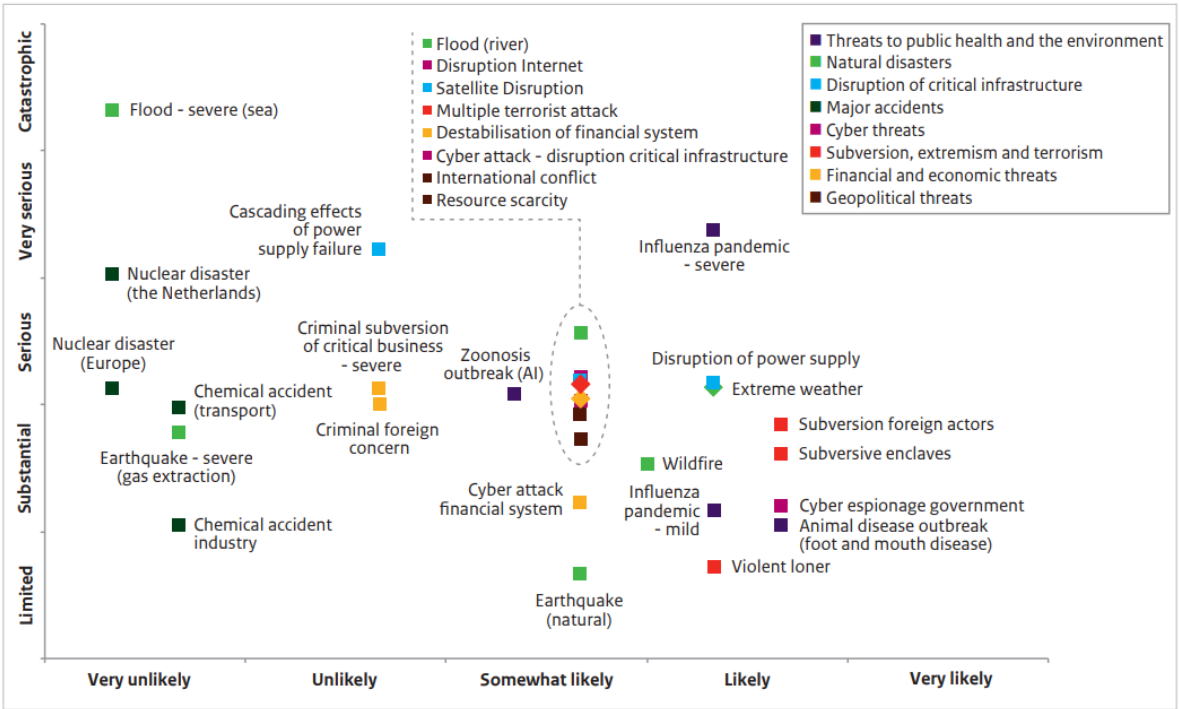
Class; general qualitative approach	Quantitative approach	Qualitative approach malicious
Very unlikely	Less than 0.05%	No specific indications; not conceivable
Unlikely	0.05 to 0.5%	No specific indications; somewhat conceivable
Somewhat likely	0.5 to 5%	No specific indications; conceivable
Likely	5 to 50%	Indications; very conceivable
Very likely	More than 50%	Specific indications that scenario is going to happen

Appendix 21. Netherlands: Criminal foreign concern impact score.

Likelihood assessment							
		Very unlikely	Unlikely	Somewhat likely	Likely	Very likely	Explanation
Likelihood of the scenario occurring between now and 5 years.			◎				In the scenario the focus is on a lack of integrity up to ministerial level. That is considered unlikely.
Impact assessment							
Security interest	**Criterion**	**Limited**	**Substantial**	**Serious**	**Very serious**	**Catastrophic**	**Explanation**
Territorial	Territory						Not applicable.
	International position	◎					
Physical	Fatalities	●					A small number of fatalities as a consequence of criminal vendettas.
	Seriously injured and chronically ill people		◎				As a consequence of stress, unrest, increase in drug use.
	A lack of life's basic necessities						Not applicable.
Economic	Costs				●		The scenario shows that a total of 65 billion may be withdrawn. However, the question is whether it is possible to force criminal investors to sell their assets. For that reason a lower amount is assumed (< 50 billion).
	Violation of vitality	●					This means 10,000 unemployed while the debt ratio is scarcely compromised.
Ecological	Violation of nature and the environment						Not applicable.
Socio-political	Disruption to daily life		◎				Some of the people who end up unemployed will, to a limited degree, be less able to participate in social activities.
	Violation of constitutional democratic system			◎			For example in the form of 'contamination' of officials, conflicts of interests in political decision-making and public administration, failure of the system.
	Societal impact			◎			Broad social anger and resentment; also aimed at the elite.

◎ average to considerable uncertainty; ● minor uncertainty

Appendix 22. Risk diagram including the scenarios which serve as illustrations of the threat-related themes.



Appendix 23. Estonia: Current constraints of local municipalities risk management & crisis management

No	Observation
1	**Legal**
1.1	**The current regulation on municipality role in crisis preparedness is not precise enough.** It should specifically require crisis preparedness of local municipalities and list the corresponding requirements in more detail.
1.2	**Autonomy of local municipalities.** If the central government requires municipalities to do something, it must be included in the legislation or mutually agreed. Budgetary resources need to be allocated for this.
2	**Organisational and governance**
2.1	**Local municipalities are not sufficiently involved in crisis management planning.** Regarding national defence emergencies, they are not even informed of the expectations to them (national secret), however they have a significant role to play. For other emergency risk types managed at state authority level, local municipalities are not engaged in HOLP creation either but at least in most cases they are informed of the outcome through regional crises committees.
2.2	**Lack of commitment by the local municipal council to crisis management.** Crisis management will always compete with day-to-day politics. Investing into visible benefits for the public is politically motivated, crisis management is not. Many municipal councils do not see value in investing in preparedness.
2.3	**Unclear responsibilities of local municipalities in crisis management**.

No	Observation
	Numerous parties solve their aspects of the crisis; however, co-operation is limited, and HOLP-s are vague when it comes to municipality role. Unclear responsibility also leads to freeride effect and allows municipalities not to pay attention to crisis management.
2.4	**Examples of not valuing the proactiveness of local municipalities on crisis management.** If municipalities take proactive initiative, these should be valued on the state level – overriding or ignoring activities and information from local municipalities demotivate future actions. Examples from Covid-19 crisis management: HB did not react to information from local municipalities regarding businesses that do not follow Covid-19 guidance and should be sanctioned or closed. The Ministry of Education overruled municipalities' decisions to close schools (even when HB recommended it). This means that next time the municipalities are more likely to wait for specific guidance rather than react themselves.
2.5	**Speed of changes in staff of local municipality affects risk assessment processes.** The changes in the local municipality can happen often, based on the election cycle, sometimes due to political instability even more often than once in 4 years. If the governing people change, they often start assessing crisis events all over again, and do not consider what has been made by the previous government (might even override the commitments made and change the budgetary allocation). In addition to priority setting, as prior risk planning activities are not documented in a structured way so the basis to continue the work in progress is weak. On the contrary, in some municipalities, the people in charge may remain the same for decades. Crisis events tend to get attention, if there has been a crisis, but if nothing has happened during the decades in power, there is lack of motivation for increasing preparedness.
2.6	**Size and the resources available matter**. The majority of local authorities are too small to effectively afford to pay attention to emergency preparedness. However, size or resource constraints should not be considered an excuse not to deal with risk management. If municipalities struggle on their own, they may be more likely to co-operate with others or merge further.
2.7	**Majority of the municipalities feel they lack sufficient funding and personnel with appropriate risk competences.** Although local municipalities know they need to manage all requirements with the funding available, they feel state level risk mitigation priority setting initiatives should come together with sufficient additional funding. For example, during Covid, state attention was directed to ventilation systems of education facilities and while restoring the ventilation system costs about 250 000 € in one sample municipal school, the allocated support from the state to the municipality was only 3% of this.
2.8	**Simply putting together a risk analysis on paper (or buying a ready-made risk assessment) does not help local authorities and make them think risk events through**. New approach must trigger internal analysis. Crisis management exercises are considered the most effective tool by many stakeholders.
3	**Operational**
3.1	**Duplicating communication.** When state institutions need information from local municipalities the questions are not coordinated – the same information is asked from various sources (from municipality government but also from its institutions) duplicating the work done. Duplication also happens when different state institutions give information to local municipalities. The messages may occasionally even contradict each other.
3.2	**Smaller local municipalities hide behind the "but we do not have to do it" mentality**. In addition, the local municipalities are not keen to admit that there are things they should do but are unable to do.
3.3	**Lack of feedback on the preparedness.** If no one gives the local municipalities continuous feedback on what they currently do, they get the impression that everything is in a good shape.
3.4	**Risk analysis focus is on one risk (or location) at a time.** Interdependencies of different events and services (e.g. storm with blocked roads also in other neighbouring municipalities, loss of electricity and thus also heavily affected other services) are currently rarely considered. Municipality focus is within its own borders, there could be a need to keep in mind potential risk events from other municipalities and how it could influence the referent municipality.

No	Observation
3.5	**Resources available to solve the crisis may not be adequate or complex crisis.** State level and municipalities may rely on the same assets, meaning one of them does not have real access to the assets during the actual crisis. For example, road Maintenance service providers can promise the use of their equipment to the National Transportation Authority and to local municipalities simultaneously and no-one has a clear overview of the total available equipment.
3.6	**Resource allocation prioritization is often not considered in advance.** For example, municipalities say that they have bought (usually 1-3) generators. These generators are used to make sure water and sewage services are provided if there is a power outage. But they also can be used in social care facilities if needed or at evacuation sites. It is unclear what takes priority. Lack of priority use areas applies also to local RB resources if there is a crisis that impacts multiple areas simultaneously.
4	**Technical**
4.1	**Low usage of DDDM principles in local municipalities**, Local municipalities lack the will and the required skills. Most risk management decisions are experience or belief based rather than data driven.
4.2	**Data accessed freely through SE is too general for municipalities.** Municipalities have access to county level information but there are different municipalities in one county. Asking for specific information regarding the municipality is too expensive.

Appendix 24. Estonia: Constraints of emergency level risk assessment and management system in Estonia

1	Legal (EU and national)
1.1	**Data protection issues.** As currently seen by the stakeholders, data protection restrictions limit and/or slow down crisis management activities across the state
2	**Organisational and governance**
2.1	**The responsible authorities tend to be understaffed when it comes to risk management.** Even in the larger responsible state authorities there is often only one person in charge of the risk analysis, mapping, HOLP-s and its coordination with different stakeholders. As such, improving the emergency risk assessment and its coordination across stakeholders may need additional resources or personnel.
2.2	**In the risk assessments, the authorities dealt with their own risks separately**. The co-ordination with other institutions was done, but to a very small extent.
2.3	**Risk analysis is often too heavily triggered by one risk event only**. The interdependencies of different events and services (e.g. storm with blocked roads and flood, loss of electricity and thus also heavily affected other services) are currently rarely analysed.
2.4	**Complications to engage other affected parties in HOLP-s.** When making HOLP-s, authorities struggled with involving authorities to whom crisis management is not prioritized task
3	**Operational**
3.1	**Improper timing of emergency risk assessment and HOLP-s.** Last time, all emergency risk assessments and HOLP-s were made simultaneously, although they should be sequentially done. As all responsible authorities did HOLP-s at the same time, there was no time buffer to engage and coordinate the outcomes.
3.2	**The risk assessments are scenario based.** This means that the risk approach is not defined and often done from the perspective of the area where the responsible person has most knowledge. However, the consequences of crisis are always more diverse.
3.3	**Limited follow-up activities after the risk assessments and HOLP-s have been completed.** The current risk management activities often end with HOLP that maps the existing or missing capabilities; however, improving on the missing capabilities is not required or monitored. Moreover, these plans are static – they are not updated if circumstances change (e.g. some of the equipment has become unusable or people with certain competences have left the organisation). This can also restrict pre-emptive disaster loss data management to be implemented.

Appendix 25. Estonia: Constraints of disaster loss data management system in Estonia

1	Legal (EU and national)
1.1	**No legal requirement exists for disaster loss calculation or crisis data access/collection.** As such, there are very limited instances of attempts to quantify the disaster loss.
2	**Organisational and governance**
2.1	**The transition of the coordination of crises and emergencies to GO needs some more time to settle in completely.** As the responsibilities for the coordination of crises and emergencies not related to national defence were transferred from The Ministry of Internal Affairs to GO took place only in June 2021, some processes still need some time to settle in. For example, stakeholders indicated that the continuation of national level emergency trainings has not yet been restored.
2.2	**It is unclear who should be responsible for disaster loss data quantifications**.

	Different views whether it should be the responsible authority who does calculate it as a wider impact or each involved authority should do it independently, based on the affected stakeholders in their domain. As of today, nobody sees it as potentially their responsibility area.
2.3	**Potential for wider integration role of Regional Crisis Committees.** Regional Crisis committees could take a wider role both in risk assessments coordination and disaster loss quantification – currently, they function mostly to share information, but they are well placed to act as integration platforms necessary for both improved national level risk assessments but potentially also for disaster loss data management where a society-wide approach is needed.
3	**Operational**
3.1	**People who carry out risk analysis in institutions lack sufficient financial competence to make financial projections.** Crisis management expert is not simultaneously an economic expert who can adequately evaluate economic impacts. Responsibility needs to be shared.
3.2	**Personal contacts are key to get access to relevant data.** If it is unclear if and where some data exists in the public sector, personal contacts and asking around can help. Getting access to private sector data is request-based. The private sector is happy to share data during acute crisis and if they see a clear benefit for themselves; however, outside of a crisis this is less likely to happen.
4	**Technical**
4.1	**Country's overall issues in data management also apply to data used for crisis and risk management.** For example, restricted access to state databases and registers within civil service, low level of data standardisation/classification, limited knowhow of available data resources etc.
4.2	**Updating national databases has delays, therefore the data is only partially relevant or usable in crisis situations**. Alternative solutions (such as asking for information from the private sector) may be needed. For retrospective disaster loss calculations this may be sufficient, but for quantifications done for quick decision-making (such as Covid19 restrictions) more recent (near real time) data is needed.
4.3	**Authorities have limited access to best practice.** Information on how other countries calculate disaster loss or even operational cost of specific risk events is currently not available to the stakeholders. However, even in specific situations where the information is available it is difficult to transfer into the Estonian context so it would remain relevant.
4.4	**No methodology in place to start quantifying the disaster loss.** Using historical examples of previous crises is complicated. Similar events might have happened decades ago and that is too long ago for adequate comparison. It is unclear what kind of data is needed for the assessment, does the data exists and where to get it, and who needs to be contacted in order to get access to it. Unclear timespan to be looked at – the cost of a crisis depends on the length of a crisis, it is difficult to predict how long a crisis would last. For example, Covid-19 pandemic has turned out to be a lot longer than was expected in the emergency risk assessment and HOLP.

Appendix 26. List of interviews and discussion groups

Organisation/event	Date of the interview	Interviewees
All Stakeholder Workshop	18.03.2022	All stakeholder workshop
OECD	21.03.2022	Nestor Alfonzo Santamaria Jon Roche (OECD) Triin Raag (GO)
The Government Office of Estonia – Best foreign practices	22.03.2022	Galina Danilišina (GO) Triin Raag (GO)
The Government Office of Estonia	25.03.2022	Galina Danilišina (GO) Triin Raag (GO)
The Government Office of Estonia	31.03.2022	Galina Danilišina (GO) Triin Raag (GO)
PwC Netherlands	5.04.2022	Pascal Huizinga
The Government Office of Estonia – overview of SITIKAS	8.04.2022	Galina Danilišina (GO) Keaty Siivelt (GO) Triin Raag (GO)
Stakeholder workshop	14.04.2022	Representers of Tartu, Tallinn, Alutaguse, RB, Ministry of Finance
Defence department of Ireland	21.04.2022	Kealan McMoreland
PwC Sweden	21.04.2022	Nicolas Berglund (department of Security Regulations)
The Government Office of Estonia	22.04.2022	Triin Raag (GO)
The Government Office of Estonia	29.04.2022	Galina Danilišina (GO) Triin Raag (GO) Erik Ernits (GO)
Practice exchange between The Government Office of Estonia and MSB Sweden	06.05.2022	Anna Nyman (MSB) Galina Danilišina (GO) Julia Fredriksson (MSB) Werger Svante Triin Raag (GO)
The Government Office of Estonia	06.05.2022	Galina Danilišina (GO) Triin Raag (GO)
The Government Office of Estonia	13.05.2022	Galina Danilišina (GO) Triin Raag (GO)
The Government Office of Estonia	20.05.2022	Galina Danilišina (GO) Triin Raag (GO) Erik Ernits (GO)
Stakeholder Workshop	23.05.2022	Representers of Tartu, Tallinn, Narva, Hiiumaa, RB, Ministry of the Interior, Ministry of Finance, MoE, MoEC,
Practice exchange between The Government Office of Estonia and Ireland	24.05.2022	Kealan McMoreland (Defence of Ireland) Galina Danilišina (GO) Triin Raag (GO)

Organisation/event	Date of the interview	Interviewees
The Government Office of Estonia	27.05.2022	Galina Danilišina (GO) Triin Raag (GO) Erik Ernits (GO)
The Government Office of Estonia	03.06.2022	Galina Danilišina (GO) Triin Raag (GO) Erik Ernits (GO)
Practice exchange between The Government Office of Estonia and Ireland	10.06.2022	Paul Rock (Ireland) Keith Leonard (Ireland)
The Government Office of Estonia	10.06.2022	Galina Danilišina (GO) Triin Raag (GO) Erik Ernits (GO)

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