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

Deliverable 2.1: Risk mapping and disaster loss data management: Current

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 organisation with regard to risk.[1]
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.[2]
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.[3]
Compound risk	When multiple risks occur simultaneously, or one after another.[4] 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.[5]
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.[6]
Disaster loss accounting	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;[7]
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

[1] The International Organization for Standardization “ISO31000:2018 - RISK MANAGEMENT”

[2] The International Organization for Standardization “ISO/DIS 22300 Security and resilience – Terminology”

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

[4] 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.

[5] Zscheischler, J., Martius, O., Westra, S. et al., A typology of compound weather and climate events. 2020. https://www.nature.com/articles/s43017-020-0060-z

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

[7] T. D. Groeve, K. Poljansek D. Ehrlich, „ Recording Disaster Losses: Recommendations for a European approach”, Joint Research Centre – Institute for the Protection and the Security of the Citizen, accessed 2013, https://reliefweb.int/sites/reliefweb.int/files/resources/lbna26111enn.pdf.

Term	Definition
	development, disaster risks can be assessed and mapped, in broad terms at least.[8]
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.[9]
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.[10]
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.[11]
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.[12]
Crisis management	A system of measures which includes preventing, preparing for and resolving an emergency.[13]

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

[9] P. Conforti, G. Markova, D. 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/.

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

[11] Riigi Teataja, „Emergency Act", published June 13, 2017, https://www.riigiteataja.ee/en/eli/513062017001/consolide
[12] Riigi Teataja, „Emergency Act", published June 13, 2017, https://www.riigiteataja.ee/en/eli/513062017001/consolide
[13] Riigi Teataja, „Emergency Act", published June 13, 2017, https://www.riigiteataja.ee/en/eli/513062017001/consolide

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
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 describing the current situation of the Estonian risk and crisis management process. This report aims to give an overview of the risk management activities carried out in local municipalities and describe how the activities contribute to the wider national system of crisis management. Moreover, this report aims to create an understanding of the disaster loss data management attempts at national level. The goal of the report is to understand the current system, including its strengths and weaknesses, in order to create a foundation for improving the practices.

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 the 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 quantification methodology for state authorities.

Document analysis and interviews (both group and individual) with various stakeholders were conducted to obtain the understanding of the current situation.

Key findings

Numerous findings were identified by those interviewed during the current situation mapping phase.

Findings regarding the risk and crisis management system:

- The crisis management in Estonia is organised at three levels: the GO (policy design and co-ordination); seven emergency respondent authorities (emergency risk analysis and assembling emergency management plans, managing the emergency response and risk communication); and three vital services continuity co-ordinators (advising vital service providers and establishing continuity requirements, conducting emergency exercises, supervision of the service providers, emergency management in the case of a service interruption, assembling emergency management plans and managing the emergency response, risk communication) and local municipalities (continuity of local three vital services, crisis committees).
- HOLP-s are basically co-operation agreements between different agencies involved. Larger local municipalities also put together their own HOLP-s for vital services which they organise, but very often they are not involved in the process of creating the public authorities' HOLP-s.
- The methodology used in the 2020 emergency risk assessment had certain drawbacks that should be overcome for the following assessment – a parallel timeline for all authorities and narrow situational scenarios. Those mentioned above created a situation where all involved authorities did not have time to meaningfully engage and analyse what would be required from them during the emergency. Therefore, the investments in risk reduction, preparations and increasing capabilities were limited.
- The legal framework of emergency management and risk assessment as well as HOLP-s assembled by the emergency management authorities focus on the risk events that may cause an emergency of a national magnitude. This approach establishes a national terminology used by all and leads to local municipalities occasionally disregarding emergency and crisis management because it is seen as not

their responsibility. There is less focus on emergencies at local level and risks impacting the continuity of local services.

- The main tasks of local authorities are stated in the Local Government Organisation Act. All local issues are dealt with and resolved by local authorities unless assigned to other persons according to the law. Local authorities are autonomous - the state cannot assign additional tasks without providing necessary resources.
- Regulatory requirements for local municipalities in relation to crisis management are minimal. All local municipalities are all obligated to set up a crisis committee that meets regularly. The crisis committees assess local risks and report their annual activities to the Rescue Board. Larger municipalities have additional obligations in relation to vital services.
- There are 79 local municipalities, 33 of which have over 10,000 people. These 33 municipalities must create emergency response plans, establish continuity requirement for vital service providers and carry out the supervision over the service providers as they are responsible for the continuity of the vital services (water supply, central heating and operability of local roads (indirectly also electricity supply as this affects other vital services)). HOS sets out the further obligation to the service providers who must conduct vital service continuity risk assessments and action plans.
- Estonian Rescue Board has a key role in increasing local municipalities' risk awareness, as in addition to participation in local crisis committees, they arrange constant regional crisis committees and general co-ordination and training activities.
- The types of risks addressed by municipalities vary drastically and depend heavily on the size, composition of crisis committee and existence of enthusiastic public servants in the municipality.
- Numerous potential places to host the local municipality's risk mapping methodology have been shortlisted: Minuomavalitsus.ee, the GO Situational Centre SITIKAS, Estonian Academy of Security Sciences (crisis management platform), The Rescue Board (e-learning site).

Findings regarding the disaster loss management system:

- Disaster loss data management is a relatively new topic for Estonia, and its maturity level is very low. Different terminology is used and there is a mixed understanding about the concept, its potential value and need. Some people are very supportive of the idea, some are sceptical about the real practical application possibilities.
- In 2020, all authorities responsible for the emergency risk analysis had to calculate an estimation of potential loss of the emergency, but there was no specific methodology to be followed. Some respondents did not do it (as no methodology or data was available), some tried to estimate it. In the latter case, it was only calculated as a direct monetary cost for the assessing entity (e.g. cost of overtime work for employees or equipment needed) and not a loss to the broader society.
- Some ministries in Estonia made selected disaster loss estimates in relation to the COVID-19 measures. The need was driven by the Government in relation to assessing different COVID-19 restriction alternatives. Assessments were carried out from the perspective of estimation of the potential compensations needed in case of COVID-19 restrictions are applied. Many ad hoc data sources were used to make the calculations, including private sector data.
- The European Flood Directive calls for the establishment of themechanisms to assess the risk of flooding in Europe and to provide the room for a disaster risk reduction. Flood risk assessments require information on past floods to establish the probability of flood impact occurrence and some total loss estimations.

Recommendations

Recommendations for improving the local municipalities' risk awareness:

- Establishing clear and documented expectations for local municipalities regarding their role in crisis management.

- Making information (both data and guidance) available in one environment for all the municipalities.
- Local authorities need a common shared methodology and sharing of best practices.
- Filling in risk the assessment documents does not necessarily improve the risk awareness – it is important that local authorities have an opportunity to play through different crisis scenarios via crisis exercises regularly.
- If any materials, guidance, or crisis management environment is created, it cannot be a one-off activity but rather needs a continuous upkeep, improvement and updating.
- There is a need for shared (and simple) methodology that can be continuously updated. It has to be defined what kind of data is needed for local municipality's risk assessment and how they can get access to the data in question.

Recommendations for establishing the disaster loss management system:

- There is a need for a shared understanding of the disaster loss system's practical use cases for the stakeholders to put efforts into applying it.
- There is a need for shared (and simple) methodology that can be continuously updated. It has to be defined what kind of data is needed in the disaster loss data management system.
- Disaster loss data management needs specific skills. These skills are not currently available in the seven emergency management authorities. Moreover, these authorities currently do not possess a wide cross-sector view of the broader impacts of a risk event; therefore, they may not be able to calculate society-wide disaster loss. Proper authority with an overall wide view, risk/financial impact competences and access to the different authorities' risk information should be determined to drive the disaster loss calculations.
- The authority that will be appointed to co-ordinate the disaster loss calculations should also be able to define and drive forward the steps following the loss estimations (initiate the increase of crisis capabilities, initiate investment discussions in prevention, etc.).

Lühikokkuvõte

Aruande eesmärgid

Aruande eesmärgiks on kirjeldada hetkeolukorda Eesti riski- ja kriisijuhtimise protsessis. Aruanne loob ülevaate kohalikes omavalitsustes läbiviidavatest riskijuhtimise tegevustest ning kirjeldab, kuidas antud tegevused on seotud laiema riikliku kriisireguleerimise süsteemiga. Lisaks on selle aruande eesmärk luua arusaam riikliku kriisikahjude arvutamise süsteemi hetkeolukorrast. Aruande eesmärk on mõista tänase süsteemi tugevusi ja nõrkusi, mis on süsteemi täiustamise aluseks.

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.

Hetkeolukorrast arusaamiseks viidi läbi dokumentide analüüs ja intervjuud (nii grupi- kui ka individuaalsed) erinevate osapooltega.

Tähelepanekud

Hetkeolukorra kaardistamise etapis toimunud intervjuud hõlmasid mitmeid tähelepanekuid.

Tähelepanekud riski- ja kriisijuhtimissüsteemi hetkeolukorra kohta:

- Kriisireguleerimine on Eestis korraldatud kolmel tasandil: Riigikantselei (kriisireguleerimise poliitika kujundamine ja koordineerimine); 7 hädaolukordade eest vastutavat asutust (hädaolukordade riskianalüüside ja plaanide koostamine, hädaolukordade lahendamise juhtimine, riskikommunikatsioon) ning elutähtsate teenuste toimepidevuse korraldamise eest vastutavat 3 riigitasandi asutust (ettevõtete nõustamine ja elutähtsate teenuste toimepidevuse nõuete kehtestamine, õppuste läbiviimine, järelevalve, elutähtsa teenuse katkestusest põhjustatud hädaolukorra lahendamise plaani koostamine ja hädaolukorra juhtimine, riskikommunikatsioon). ja kohalikud omavalitsused (kriisikomisjonid, kolme elutähtsa teenuse toimepidevuse korraldamine).
- Hädaolukordade lahendamise plaanid (HOLP) on põhimõtteliselt koostöölepingud erinevate kaasatud asutuste vahel. Suuremad kohalikud omavalitsused koostavad enda korraldavate elutähtsate teenuste HOLP-e, kuid ei ole sageli kaasatud riigiasutuste HOLP-ide loomisesse või on nende kaasamine väga üldine.
- 2020. aasta hädaolukordade riskianalüüsis kasutatud metoodikal olid teatud puudused, mida tuleks järgmisel hindamisel vältida – paralleelne ajakava kõikidele ametiasutustele, kitsad olukorrastsenaariumid. See lõi olukorra, kus kaasuvatel asutustele ei olnud ajalist võimekust sisuliselt kaasuda ja enda vaatest oma rolli läbi mõelda sh mõelda, mida hädaolukorra lahendamine neilt eeldab ja kas vajalikud osakused vahendid on olemas. Seetõttu ei järgnenud riskianalüüsile maandamis meetmeid, ettevalmistust või võimekuste tõstmist, et hädaolukorraga paremini toime tulla.
- Hädaolukordade juhtimise õiguslik raamistik, hädaolukordade riskihindamine ja ka asutuste poolt koostatavad HOLP-id keskenduvad nendele riskisündmustele, mis võivad põhjustada riikliku ulatusega hädaolukorra. Selline lähenemisviis toob kaasa selle, et kohalikud omavalitsused ei pea kriisijuhtimist oma ülesandeks ning hädaolukordade ja kriiside juhtimine jääb seetõttu tähelepanuta.

Nendele kohaliku tasandi hädaolukordadele ja riskidele, mis mõjutavad kohalike teenuste järjepidevust, keskendutakse vähem.

- Kohaliku omavalitsuse põhiülesanded on sätestatud kohaliku omavalitsuse korralduse seaduses. Kõigi kohalike küsimustega tegelemine ja nende lahendamine on kohalike omavalitsuste vastutus, välja arvatud juhul, kui see on seadusega määratud teistele isikutele. Kohalikud omavalitsused on autonoomsed – riik ei saa neile anda täiendavaid ülesandeid ilma vajalike ressurssideta.
- Regulatiivsed nõuded kohalikele omavalitsustele seoses kriisireguleerimisega on minimaalsed. Kõik kohalikud omavalitsused on kohustatud moodustama kriisikomisjoni. Kriisikomisjonid hindavad kohalikke riske ja annavad oma iga-aastasest tegevusest aru Päästeametile. Suurematel omavalitsustel on lisakohustused seoses elutähtsate teenustega.
- Eestis on kokku 79 kohalikku omavalitsust, millest 33-s elab üle 10 000 inimese. Need 33 peavad koostama hädaolukordade lahendamise plaanid ja kehtestama elutähtsate teenuste toimepidevuse nõudeid, tegema järelevalvet teenuseosutajate üle, kuna nemad vastutavad elutähtsate teenuste (veevarustus, keskküte ja kohalike teede toimimine (kaudselt ka elektrivarustus, kuna see mõjutab teisi elutähtsaid teenuseid)) toimepidevuse eest. Omakorda näeb hädaolukorra seadus ette ka kohustusi teenusepakkujatele, kes muuhulgas peavad koostama oma elutähtsa teenuse toimepidevuse riskianalüüsi ja plaani.
- Kohalike omavalitsuste riskiteadlikkuse tõstmisel on võtmeroll Päästeametil, kes lisaks kohalikes kriisikomisjonides osalemisele korraldavad pidevaid regionaalseid kriisikomisjone ning tegelevad ka üldiste koordineerimis- ja koolitustegevusega.
- Omavalitsuste poolt käsitletavate riskide liigid on väga erinevad ja sõltuvad suuresti kriisikomisjoni suurusest, koosseisust ja liikmete entusiasmist.
- Loodud on mitmeid potentsiaalseid keskkondi, kuhu meie poolt loodav kohaliku omavalitsuse riskide hindamise metoodika paigutada: Minuomavalitsus.ee, Riigikantselei Situatsioonikeskus SITIKAS, Eesti Sisekaitseakadeemia (kriisireguleerimise õppeplatvorm), Päästeamet (e-õppe platvorm).

Kriisikahjude hindamise süsteemiga seotud tähelepanekud:

- Kriisikahjude hindamine on Eesti jaoks suhteliselt uus teema ja selle küpsusaste on madal. Kriisikahjude hindamiseks kasutatakse erinevat terminoloogiat ja arusaam selle potentsiaalsest väärtusest ja vajadusest on segane. Mõned osapooled toetavad ideed väga, teised suhtuvad selle reaalsesse praktilisse rakendusvõimalustesse skeptiliselt.
- 2020. aastal pidid kõik hädaolukordade riskianalüüsi koostamise eest vastutavad asutused riskianalüüside koostamisel arvutama hädaolukorra tekkimise võimalikku kahju, kuid konkreetset metoodikat, mida järgida, ei olnud. Mõned asutused ka arvutusi ei teinud (kuna metoodikat ega andmeid ei olnud), osad lähtusid kogemusele tuginevatest hinnangutest. Viimasel juhul hinnati vaid asutusele hädaolukorra lahendamisel tekkivaid rahalisi kulusid (nt töötajate ületunnitöö või vajalike seadmete maksumus), mitte kahju laiemale ühiskonnale.
- Mõned Eesti ministeeriumid koostasid Covidi meetmetega seoses valitud kriisikahjude prognoose. Kriisikahjude hindamine oli ajendatud Valitsuse poolt läbi viidud Covidi piirangute alternatiivide hindamisest. Kahjude hindamine viidi läbi Covidi piirangute rakendamisel vajalike hüvitiste prognoosimiseks. Arvutuste tegemiseks kasutati mitmeid erinevaid andmeallikaid, sealhulgas erasektori andmeid.
- Euroopa Liidu üleujutusdirektiiv nõuab mehhanisme üleujutusohu hindamiseks Euroopas ja katastroofiriski vähendamiseks. Keskkonnaministeerium on praeguseks seoses antud direktiiviga kaardistanud üleujutuspiirkonnad ja hinnanud ära ka teatud piirkondade tõenäolise kahju üleujutuse puhul. Sellega seoses on Keskkonnaministeerium arvutanud välja ka piirkonna elanike arvu, hoonete taastamise maksumuse ja üleujutust tõkestavate lahenduste maksumuse. Riski hindamiseks ja tõenäosuse leidmiseks kasutati muuhulgas ka teavet varasemate üleujutussündmuste kohta.[49]

Soovitused

Soovitused kohalike omavalitsuste riskiteadlikkuse tõstmiseks:

- Kriisireguleerimises selgete ja dokumenteeritud ootuste kujundamine kohalikele omavalitsustele
- Teabe (nii andmete kui ka juhiste) kättesaadavaks tegemine ühes keskkonnas kõikidele omavalitsustele.
- Kohalikud omavalitsused vajavad ühist metoodikat ja parimate tavade jagamist.
- Riskianalüüsi dokumentide täitmine ei pruugi tõsta omavalitsuse riskiteadlikkust – on oluline, et kohalikel omavalitsustel oleks võimalus pideval kriisiõppuste kaudu läbi mängida erinevaid kriisistsenaariume.
- Kriisijuhtimise materjale, juhendeid või keskkonna loomine ei saa see olla ühekordne tegevus, vaid see vajab pidevat korrastamist, täiustamist ja kaasajastamist.
- Metoodika, mida KOV-id kasutavad peaks olema ühtne (ja lihtne) ning seda peaks olema võimalik pidevalt uuendada. Tuleb määrata, milliseid andmeid riskide hindamisse kaasata ja kuidas KOV-il oleks võimalik saada nendele andetele ligipääs.

Soovitused kriisikahjude hindamise süsteemi loomiseks:

- Asutused vajavad ühist arusaamist kriisikahjude süsteemi praktilistest kasutusjuhtudest, et l tekiks huvi ja motivatsioon süsteemi rakendada.
- Metoodika peab olema ühtne (ja lihtsat), mida oleks võimalik pidevalt uuendada. Tuleb määratleda, milliseid andmeid on vajalik kaasata kriisikahjude hindamise andmehaldussüsteemi.
- Kriisikahjude hindamine vajab spetsiifilisi oskuseid, mis ei ole praegu hädaolukordade eest vastutavatele asutustele kättesaadavad. Lisaks ei ole neil ametiasutustel laialdast valdkonnaülest vaadet riskisündmuse laiematest mõjudest. Seetõttu ei pruugi asutused olla võimelised arvutama terviklikku ühiskondlikku kriisikahju. Kriisikahjude arvutamise eest peaks vastutama see osapool, kellel on sektorite ülene vaade, riskide/finantsmõjude hindamise pädevus ja juurdepääs erinevate asutuste riskiteabele ja vastavad volitused.
- Kriisikahjude hindamist koordineeriv asutus peab suutma määrata vajalikke jätkutegevusi ja juhtida nende elluviimist (nt algatada kriisivõimekuse suurendamist, algatada ennetusse investeerimise arutelusid jne).

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1 Introduction

1.1 Scope of the Project

1.1.1 Project Outcomes and Deliverables

This Project will **contribute towards** three **Outcomes.** It is expected that Estonia, having been closely involved in the implementation of the Project and consulted by the PwC on all draft deliverables, endorses the deliverables through its internal mechanisms and implements the work/recommendations contained in the final deliverables. As a result, the Estonian Government is supposed to:

1	2	3
 Introduce an improved DDDM process in its operational environment	 Introduce improved risk mapping and disaster loss data management in its operational environment	 Endorse the Estonian risk report

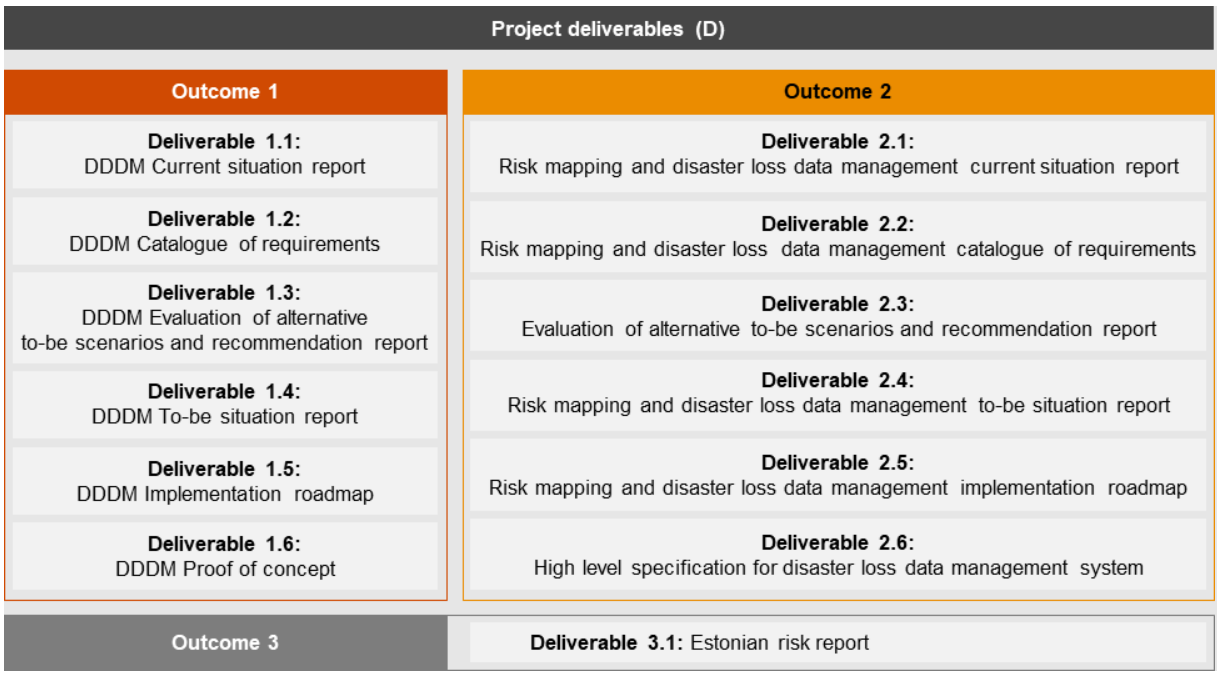
Project long-term impact

The Estonian Government takes better data-driven decisions (in particular, in the case of crisis management and prevention areas), resulting in better policy making and better investment planning, measured by the following indicators:

- The redesigned Data-driven decision-making (DDDM) approach is used across the government sector.
- The redesigned risk mapping and disaster loss data management approaches are used in crisis management and prevention.

Project deliverables and tasks

Figure 1. Overview of the Project deliverables and tasks



1.1.2 Project organisation

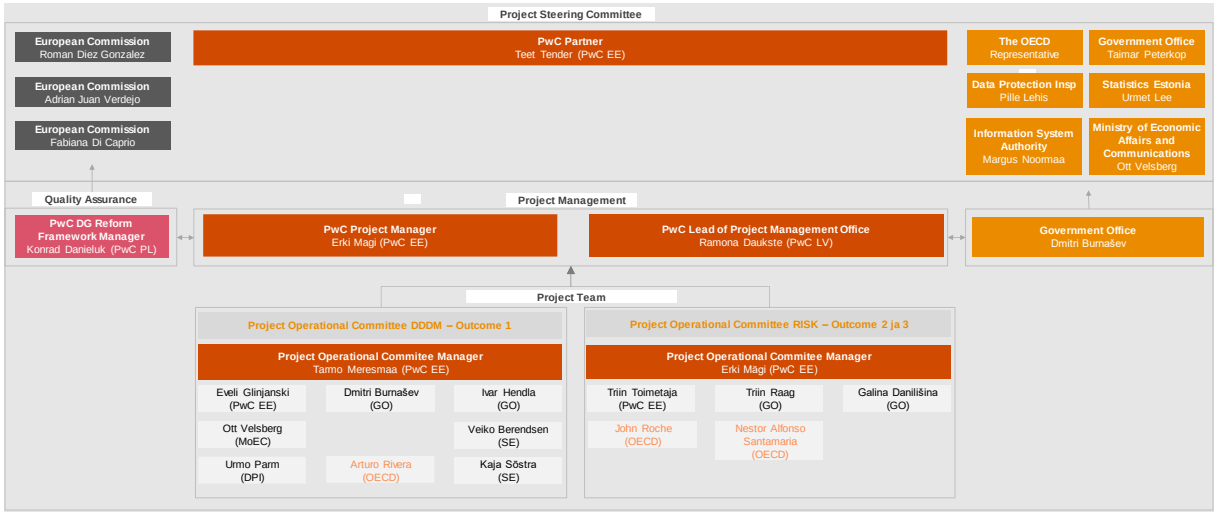
The following key stakeholders are drawn in the figure below, which make up the highest level of authority for the Project and whose representatives shall belong to the Project Steering Committee.

Figure 2. Project key stakeholders

The OECD has not been engaged and involved in the Project work as of 28 February 2022, but the Contracting Authority and the Beneficiary shall continue the discussions to agree on the conditions involving the OECD.

The detailed list of all participants is included below in Figure 3.

Figure 3. Project organisation



Project Steering Committee

For purposes of overseeing the Project's progress, the Project Steering Committee is set up with the following responsibilities:

- Oversee the execution of the Project and provide a strategic guidance.
- Make decisions on the Project's progress.
- Agree on steps to solve the potential issues.

Project Operational Committee

For purposes of overseeing the Project's progress, the Project Operational Committee for Outcome 2 is set up with the following responsibilities:

- Oversee the execution of the Project and provide a strategic guidance.
- Make decisions on the Project's progress.

- Agree on steps to solve the potential issues.

Working Principles

Several principles and practices have been discussed and agreed for the effective management of the Project Organisation:

- Project Steering Committee shall meet once every three months.
- Project Status Update Monthly Meeting once a month.
- Project Operational Committee for Outcomes 2 and 3 shall meet monthly.
- Project Status Update Weekly Meeting every Tuesday.
- Project Update Call Meeting every Friday.

Key events, besides the above-mentioned, include a seminar with all stakeholders involved in Deliverables 2 and 3 (the first one being on 11 January).

Microsoft SharePoint site has been also registered to encourage and simplify document exchange and co-operation between the Contractor and the Beneficiary. Other ad hoc types of meetings are set up on the need basis.

1.2 Scope of the report

1.2.1 Purpose and Outcome

The report has been drafted for Outcomes 2 and 3, Outcome 1 is disclosed in a separate report. The purpose of the report is to describe the current situation of risk mapping and disaster loss data management in Estonia, including local municipalities and Public Authorities involved in the process. It further aims to give an overview of the relevant regulations as well as Policies, Guidelines, Principles and Good Practices that the Estonian Public Authorities follow.

> ***This report covers only Outcomes 2 and 3*** *– risk management and disaster loss data management system in Estonia (see Figure 1 presented earlier). Separate report is issued for Outcome 1.*

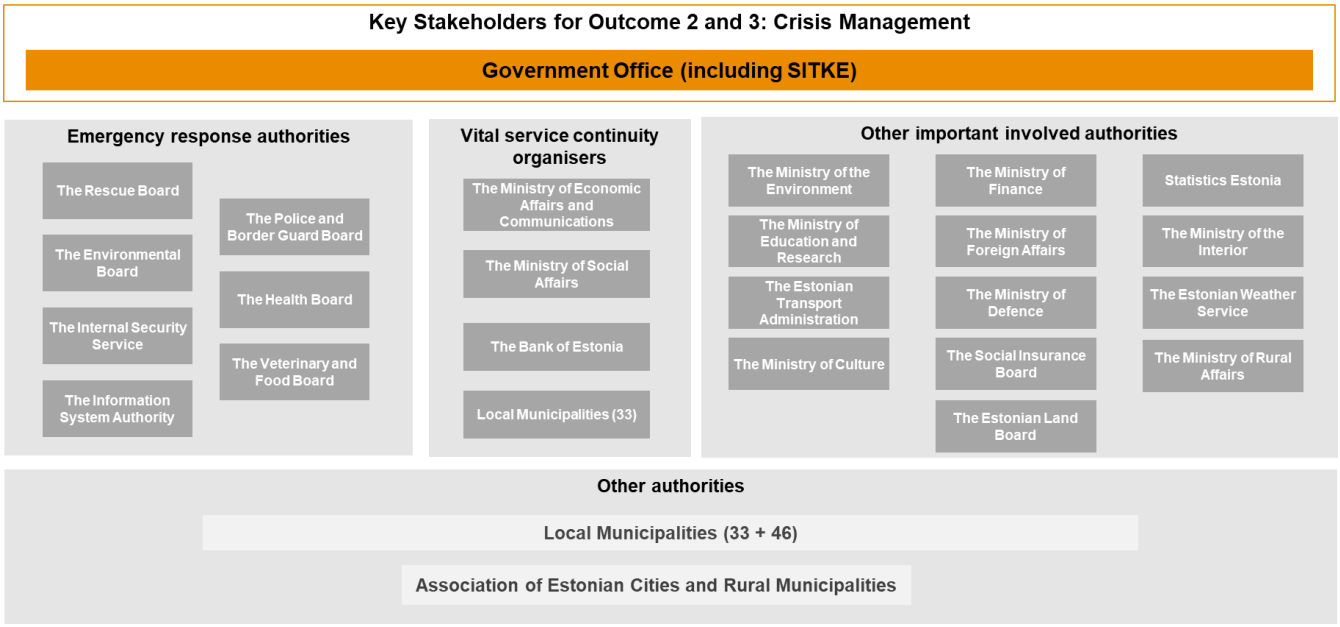
1.2.2 Scope of the Project for Outcomes 2 and 3

The scope of the Project for Outcomes 2 and 3 has two focuses. The first focus is on the **local municipalities' risk awareness and risk mapping activities** – how the risk awareness is obtained, what data sources are used, whom they co-operate with in creating a risk awareness, how the co-operation is done, and what are the outcomes of the risk mapping. 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.

1.2.3 Project stakeholders for Outcomes 2 and 3

To conduct an effective stakeholder engagement, we have identified the following key stakeholders and process participants for Outcomes 2 and 3 (Figure 4) as well as included their key tasks in the Project.

Figure 4. Outcomes 2 and 3: key stakeholders and Project participants

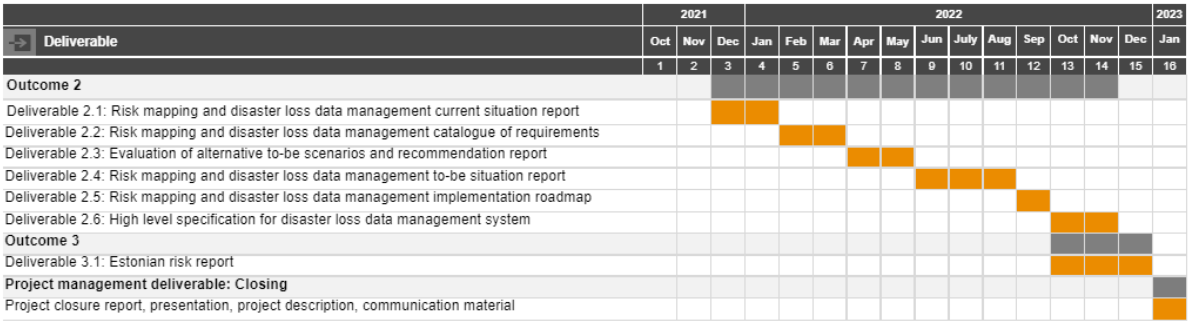


1.3 Methodology and Approach

To deliver the current situation report, methodological approach was taken to map the current situation of the local municipalities' risk mapping and state authority level disaster loss process. The aim of the mapping was to create an understanding of the overall process and how data is used to support the risk awareness and risk map creation at the local municipalities, and disaster loss data management and usage at state authorities.

Figure 5 below gives a high-level overview of the Project activities and timeline. The activities of a current situation mapping took place from December 2021 to February 2022.

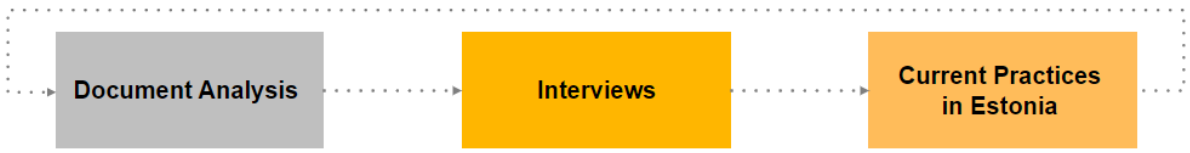
Figure 5. Project activities and timeline



Three different methods were used and combined to map the current risk mapping and disaster loss data management process (see Figure 6), as well as map the current practices which are currently being used.

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.

Figure 6. Methods used to map the risk mapping and disaster loss data management process



Semi-structured individual and group interviews were conducted with the different local municipalities, ministries and government authorities. The interviews focused on four key topics:

- What the local municipalities are doing regarding the risk management.
- How much co-operation is there between different authorities and municipalities.
- What has been done so far regarding the disaster loss management.
- What are the key obstacles and constraints related to both risk mapping and disaster loss management.

An overview of all interviewees is listed in Appendix 1Key meetings of the Project Organisation. An overview of current processes regarding the risk mapping and disaster loss management is presented in chapter 3.

1.4 Limitations

There are organisational and legal changes happening in the crisis management system in Estonia during the Project. The Estonian Government has set the goal of taking the development of broad national defence to a new level by undertaking the following:

a) Consolidating the development of the Emergency Act (HOS) crisis management policy in the Government Office (GO). On 2 June 2021, the Estonian Parliament passed the Act Amending the Emergency Act and Related Acts, based on which the current competences, powers and tasks of the Ministry of the Interior in co-ordinating crisis management have been transferred to the Government of the Republic and the GO as of 1 July 2021.[14]

b) Increasing legal clarity in crisis management by developing a new holistic legal framework to guide the emergency preparedness and management. The name of the new act in development is VOS - (valmisoleku seadus) - the Preparedness Law. The new law should merge the current HOS, the National Defence Act (RiKS) and the State of Emergency Act (ErSS). As of right now, the plan is to enter the new law into force by 2023.[15]

These changes can impact the Project as the new content of the law and respective roles of stakeholders are yet unclear. Some issues highlighted by the stakeholders regarding the operational aspects of the crisis management might get resolved by the structural changes. As the current Project and the regulatory changes are taking place in parallel, some stakeholders may become hesitant to openly share their input on the responsibilities of local authorities, as they may fear that their input could translate into new legal obligations.

Another limitation comes from the current geopolitical instability regarding Ukraine and therefore the whole Europe, especially the Eastern region. The situation has created a lot of uncertainty and changes in the workflow, and has diminished the ability of many stakeholders to contribute to the Project.

[14] Republic of Estonia Ministry of The Interior, „Kriisideks valmisolek“, December 1, 2021, https://www.siseministeerium.ee/en/node/104.
[15] Estonian Bar Association, “Valmisoleku seadus. Väljatöötamiskavatsus”, July 1, 2021, https://advokatuur.ee/uploads/files/15_07%20vtk%20vos.pdf.

2 Current situation in risk mapping and disaster loss data management

2.1 Estonian overall risk and crisis management system overview

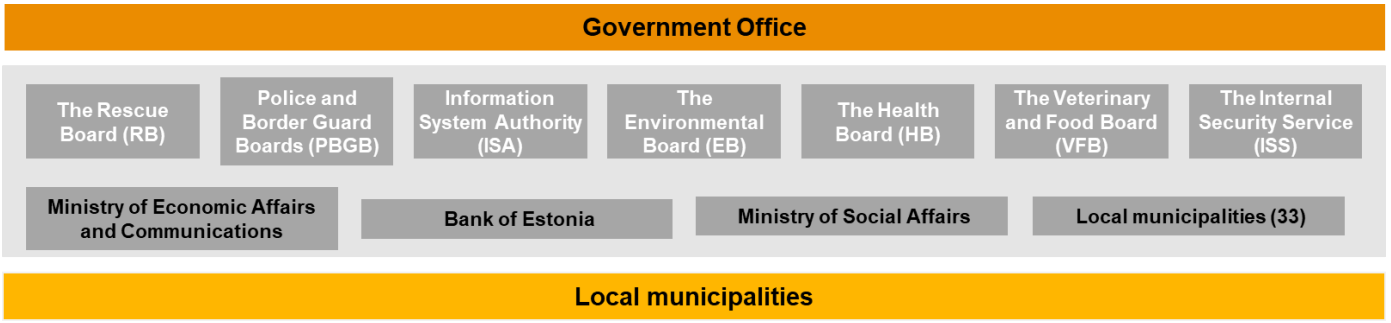
In this chapter, firstly, we will give an overview of the organisational build-up of the Estonian crisis management, and secondly, describe the focus of the national system.

Organisational structure of the Estonian crisis management system

Estonia uses decentralised approach to crisis management. The crisis management in Estonia is organised at three levels:

1. The GO is responsible for the **preparation and co-ordination of crisis management policy**. The main task of the Government is to establish the regulations and list events that could potentially lead to an emergency. The GO is co-ordinating the disaster preparedness efforts. Moreover, if the disaster event is overreaching into multiple areas of life, requiring co-ordination and co-operation of multiple agencies, The Government of Estonia announces the emergency and assigns one minister to be in charge of solving the emergency. The National Security and Defense Co-ordination Unit of the GO advises the Prime Minister on national security issues and organises the affairs of the Government Security Committee. The National Security and Defence Co-ordination Unit of the GO also manages the co-ordination of national security and defence management.
2. Depending on the cause of the emergency, **the resolution of an emergency is co-ordinated** either by the authority organising the continuity of a vital service (the Ministry of Economic Affairs and Communications (MoEC), the Ministry of Social Affairs (MoS), Bank of Estonia (BA), large local municipality) or by one of the seven public authorities with the executive power. These authorities also undertake **emergency risk assessments** for the potential risk events assigned to them by the Government and report the results back to the GO. Based on the risk assessments, the national authorities **establish national HOLP-s** (*Hädaolukorra lahendamise plaan* – Emergency response plans). Depending on the nature of the event, these emergency respondent authorities are also responsible for involving all relevant actors (other agencies, ministries, local authorities, NGO, etc.) in the operational management of the crisis.
3. In addition to certain larger local municipalities having a role in co-ordination of resolution of an emergency for the local vital services, all local municipalities are responsible for the **continuity of local services, supporting the acute crisis management and dealing with the post-crisis activities locally**. Therefore, the success of the state-wide crisis long-term effectiveness relies heavily on the local authorities.

Figure 7. The crisis management in Estonia

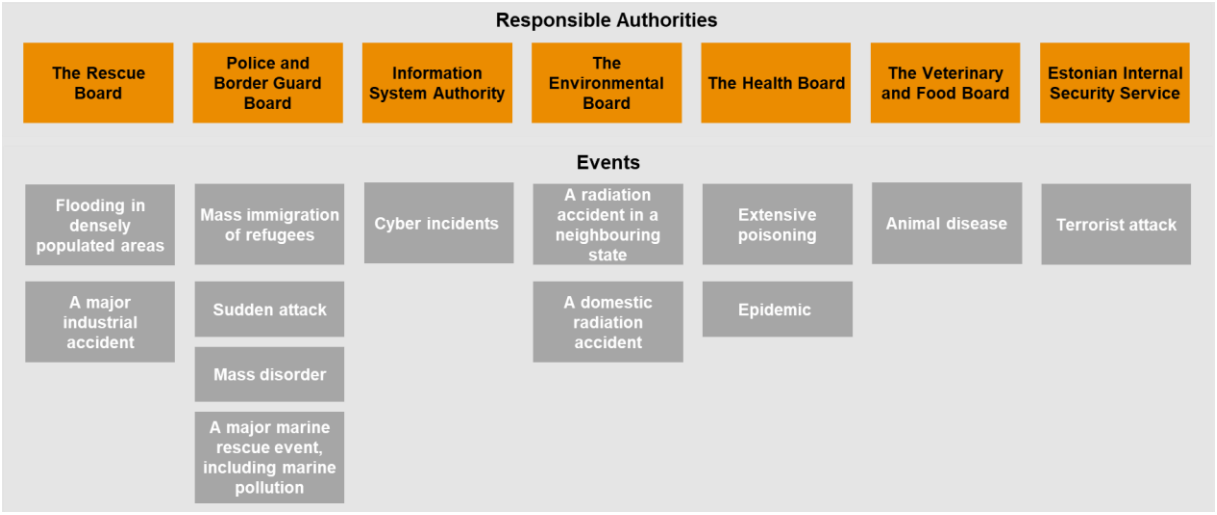


According to the assessment of the GO, the first two layers of crisis management (the three plus seven national authorities and the GO) have clear responsibilities – they are aware of which risks require their attention, what are the consequences of the risk events and which type of action is required to be carried out. However, at the level of local municipalities in Estonia, the clarity of their roles, the awareness of risk events and the potential impacts vary. The local municipalities have not been included in the previously mentioned emergency risk assessments at national level and, for years, they have not been required to carry out local risk assessments. Therefore, the GO considers local authorities the most vulnerable link in the national crisis management system. They lack skills and knowledge in the context of risk and crisis. For that reason, our main goal is to **focus on increasing the risk awareness and readiness of the local municipalities of Estonia.**

2.1.1 Role of the responsible emergency management authorities

There are seven responsible authorities handling 13 national emergency risk events, respective assessments and HOLPs.

Figure 8. The responsibilities for each authority



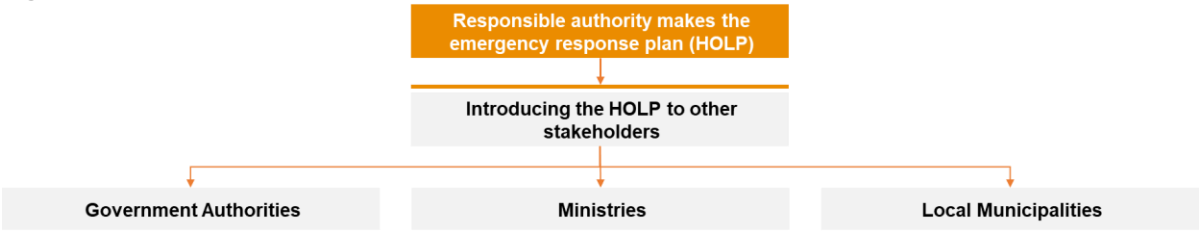
In addition to that, there are three state level authorities, which are obligated to organise the continuity of certain vital services (see section “Vital services” below for details).

All emergency management responsible agents are required to carry out risk analysis regarding the risks they are responsible for and create HOLP-s. The vital service co-ordinators (the MoS, the MoEC, Estonian Bank and 33 local municipalities) do not carry out risk analysis, however, they put together HOLP-s regarding the emergencies caused by the vital service interruption. **A HOLP** is a co-operation agreement by which the authority co-ordinating the resolution of an emergency and other authorities

involved in resolving the emergency agree upon the organisation of resolution of the emergency. The emergency response plans are approved by the relevant Ministry and the GO.[30] If there is a role for local authorities in the HOLP, relevant municipalities should be either involved in the development of the HOLP or at least the HOLP should be introduced to them. Usually, responsible authorities are taken the latter approach and introduce the plans at regional Crisis Committee meetings. See Figure 9 below.

The local authority, which has over 10,000 inhabitants, are obligated to have HOLP-s for their vital services and they must obtain the approval of the RB for the emergency response plan.[16]

Figure 9. Co-ordination of HOLP-s

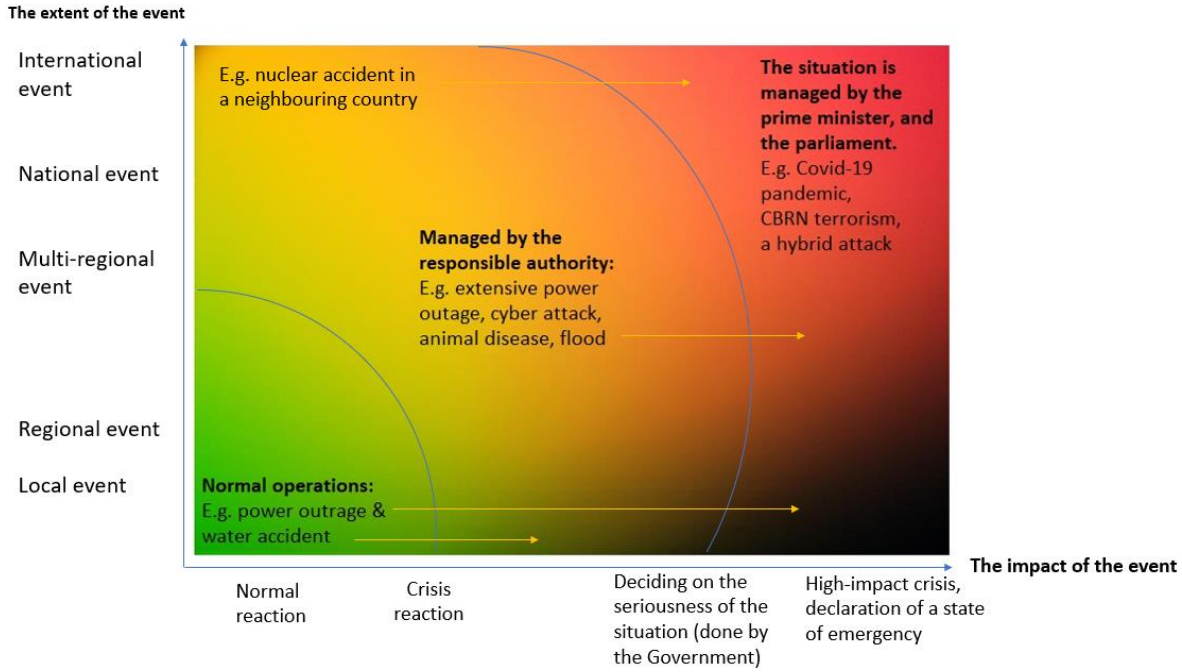


2.1.2 The focus of the Estonian risk management system

The current approach of the Estonian Government is to focus on risk events that can cause an emergency. However, depending on the nature and size of the risk event, the consequences can vary. It may be that some risk events are commonplace for the authorities or municipalities and do not require special attention. Some risk events may cause interruptions to the usual (business/service) procedures. **Some risk events that can be commonplace for the emergency management authority may cause service disruptions that require swift actions at local level.** Whether something is considered a crisis is subjective, depending on the tolerance of the reference object. For example, a power outage, which can be business as usual for the electricity provider (as small-scale interruptions occur every day), it may cause slight disruptions for the education facilities but can become a crisis if it occurs at an elder care facility (see Figure 10 below).

[16] Riigi Teataja, „Emergency Act“, in force January 1, 2022, https://www.riigiteataja.ee/en/eli/501122021001

Figure 10. Escalation of an event



In Figure 10, it is explained how the responsibility of a certain event can change throughout the time, relating to its extent of the impact. If the emergency shall be managed by the Prime Minister and the Parliament (e.g. the COVID-19 crisis, where the authority in charge was initially the HB, but over the time, the Government took over the responsibility due to the size and impact of the event), the authority handover is clearly linked to the relevant decision. Nevertheless, there seems to be a lot of uncertainty between the stakeholders when a certain event in the local municipality is big enough, so that the relevant national authority should step in charge. For example, if there is a storm and many trees have blocked the roads, clearing the trees should be a responsibility of the RB. But it depends on the severity of the roadblock and prioritisation of other similar issues in the neighbouring municipality, so the responsibility of clearing the roads can remain with the local municipality. There are no clear boundaries nor specific definitions to scale the severity of various level risk events.

Table 1. Key terms in the Estonian risk management

Key terms	Definition
Emergency	According to HOS, an emergency is 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 extensive interferences with the continuity of vital services, and resolution of which requires the prompt co-ordinated 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.[17]
Crisis management	A system of measures which includes preventing, preparing for and resolving an emergency.
Emergency risk	According to HOS, this is a situation where, based on an objective assessment of the circumstances, it may be considered that an event, or a chain of events, or an interference with a vital service may escalate into an emergency in the near future.[18]

[17] Riigi Teataja, „Emergency Act“, published May 16, 2020, https://www.riigiteataja.ee/en/eli/516052020003/.
[18] Riigi Teataja, „Emergency Act“, published May 16, 2020, https://www.riigiteataja.ee/en/eli/516052020003/.

Key terms	Definition
Risk	The chance of something happening that will have an impact on objectives; often specified as an event or set of circumstances and consequences (both positive and negative) that will flow from this.[19]
Continuity of service	Capability of the provider of the service to ensure continuous operation and to restore continuous operation after an interruption of the service.[20]

The legal framework of the emergency management, emergency risk assessment as well as HOLP-s assembled by the emergency management authorities focus on the risk events that may cause an emergency of a national magnitude. This approach establishes a national terminology used by all and leads to local municipalities, occasionally disregarding emergency and crisis management, because it is considered as not their responsibility. The relatively narrow emergency risk assessment approach (focusing on emergency risks only) may leave aside the less impactful events which are often much more relevant to the local municipalities as they occur more frequently and may still severely impact the continuity of local municipality's services. For that reason, it is necessary that the risk map methodology should also **cover the risks affecting the continuity of local municipalities' services, even in case they are not causing national level emergencies.**

Another important aspect of the Estonian risk management system is the **overall lack of the attention to interdependency of different events and compound risks** (different risk events happening simultaneously or close to each other, leaving little time to recover). The authorities co-ordinating the resolution of an emergency focus on the specific risk event that they are responsible for, assuming no other risk events have occurred simultaneously. In addition, the risk assessment is carried out only from their perspective and the co-operation with other authorities is allegedly not systemic. The same issue is also represented at local municipality level. For example, the municipality may have considered risks of roadblocks from trees due to the storm, but not in combination of electricity and cellular network coverage loss.

2.1.3 Vital services

The Emergency Act section (§) 36 lists vital services which should be continuously granted for the public. The continuity is organised by three state level authorities as follows:

- **The Ministry of Economics and Communication (MoEC):** 1) electricity supply; 2) natural gas supply; 3) liquid fuel supply; 4) ensuring the operability of national roads; 5) phone service; 6) mobile phone service; 7) data transmission service; 8) digital identification and digital signing.
- **The Ministry of Social Affairs (MoS):** 1) continuity of the emergency care for the purposes of the Health Services Organisation Act.
- **Bank of Estonia (BA):** 1) payment services; 2) cash circulation.

As noted, larger local municipalities (with over 10,000 inhabitants) have been nominated as the emergency co-ordinators due to their role as an authority organising the continuity of a vital service in three areas – **district heating, operability of local roads, water supply and sewerage**.

Disruption of these previously mentioned services can cause an emergency. Therefore, all vital service providers (c. 150 companies) have an obligation to prepare continuity risk assessment and business continuity plan of a vital service. The requirements and procedure for a continuity risk assessment and plan of a vital service are established by a regulation of the Minister of the Interior.[21]

[19] Lynn T., "Drennan et all", Risk and Crisis Management in the Public Sector, 2015, p.2.
[20] Riigi Teataja, „Emergency Act", published May 16, 2020, https://www.riigiteataja.ee/en/eli/516052020003/.
[21] The Ministry of the Interior of Estonia, "DISASTER RISK MANAGEMENT SUMMARY OF ESTONIA 2020", accessed 2020, https://www.siseministeerium.ee/media/1451/download.

2.1.4 Future developments of the Estonian risk management system

Resolving the high-impact crisis requires the short chain of command as well as co-ordinated leadership of many actors. The escalation of the high-impact crisis may also necessitate the declaration of a state of emergency or a state of war (hereinafter together a special state) specified in the Constitution of the Republic of Estonia.

To increase legal clarity in crisis management, a new holistic legal framework to guide the emergency preparedness and management is being prepared. The new act is called VOS - the Preparedness Law. The new law should merge the current HOS, the RiKS and the ErSS. As of right now, the plan is to enter the new law into force by September 2023.[22]

With VOS, one comprehensive framework will be created to resolve both civilian, and non-military and military national defence crisis under the leadership of the Government of the Republic and the Prime Minister, including a framework for resolving special arrangements. The new framework aims to ensure the integrity and coherence of the different levels and actors involved.

VOS will regulate crisis preparedness, however, the emergency will be announced and consequently triggered policy tools would only apply during the major emergencies when the PM is co-ordinating the activities. All other less impactful events will remain the responsibility to the emergency management authority (7) or service providers who need to be able to deal with the smaller events as well.

2.2 Local municipalities' risk mapping

2.2.1 The autonomy of local municipalities

There is a one-tier local municipality system in Estonia since reforming and restructuring of the legal and financial basis of the local self-government in 1993. All local municipalities – towns and rural municipalities – are equal in their legal status. [23]

All local issues are resolved and regulated by local municipalities, which operate independently in accordance with the law. In the Estonian Constitution it is stated that all local issues shall be decided and organised by the local municipalities, which shall act independently based on the laws (The Constitution of the Republic of Estonia, § 154) [24]. It is also stated that **obligations may be imposed on a municipality only based on the law or by agreement with the municipality**. **Expenditure related to obligations of the state and imposed by the law on a municipality shall be funded from the state budget.**

Local municipalities are autonomous in their activities, but in certain issues their activities are supervised by ministries, offices and inspectorates that check compliance with the law and draw attention to potential problems.

2.2.2 Local municipality's services

The main tasks of local authorities are stated in the Local Government Organisation Act (KOKS). All local issues are dealt with and resolved by the local authorities unless assigned to other persons according to the law.

As local municipalities indicated, the methodology should not only focus at the emergency/crisis level risk events, but also be usable to understand the lower impact risks that may threaten the continuity of different types of local services (but are not yet causing crisis on a wider scale). Therefore, it is important to identify what local services municipalities provide and what types of risks may cause continuity issues.

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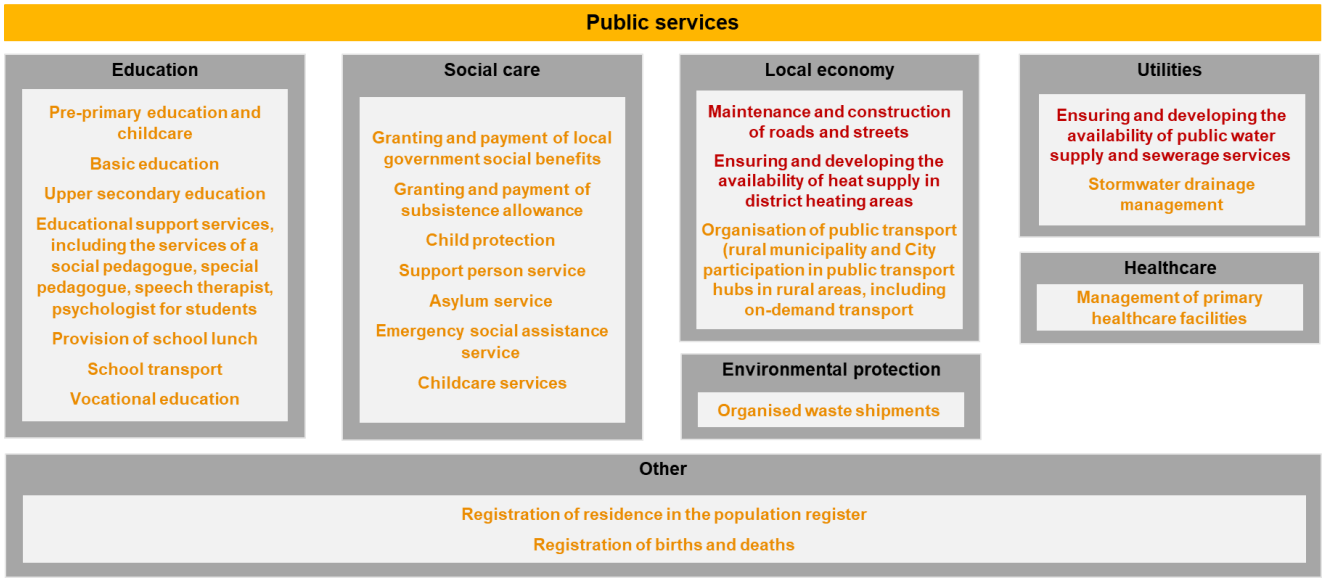
[22] Estonian Bar Association, "Valmisoleku seadus. Väljatöötamiskavatsus", accessed July 1, 2021, https://advokatuur.ee/uploads/files/15_07%20vtk%20vos.pdf.
[23] Republic of Estonia Ministry of Finance, "Local Governments", November, 1, 2019, https://www.rahandusministeerium.ee/en/local-governments-and-administrative-territorial-reform.
[24] Riigi Teataja, „Emergency Act", published December, 30, 2020, https://www.riigiteataja.ee/en/eli/ee/530122020003/.

Local authorities may arrange the provision of certain public services through the private sector (often contracted out to private companies or non-profit organisations). They may also establish agencies or joint agencies with other local authorities to provide services, be a partner or shareholder in a company, a foundation or a member of non-profit association.[13]

The local authorities are responsible for the diverse local service groups: Education; Sports and leisure, Culture, Housing and utilities; Local economy and planning; Environmental protection; Social welfare; and Healthcare. The full list of services by these subgroups is presented in Appendix 2.

In the figure below we have listed the **most important public services that a local municipality should prioritise from the service continuity perspective**. The services in red are mandatory to be ensured by the law (these are the vital services), and the services in yellow are other more critical services (as assessed by the Ministry of Finance).

Figure 11. Public services



The local municipalities should pay extra attention to risks which might influence the business continuity of the services and prioritise risks that may affect the services listed above in red and yellow. The list of risks which can affect the business continuity of local municipality's services in general can be found in Appendix 3. The criticality of each risk (and related prioritisation of mitigation) depends on the local municipality's circumstances.

2.2.3 Crisis management obligations of the local municipalities

Estonia has 79 municipalities. Every municipality is obligated to have their own Crisis Commission. The Crisis Commission must submit the Commission's work plan and an annual report to the RB. The Crisis Commission should map all risks, discuss partnerships with the vital service providers and organise emergency management exercises and trainings. The local municipalities are also obliged to make local evacuation plans (with the help of the PBGB).

There are 33 local municipalities which have a population of 10,000 (or more) people. Those municipalities have additional obligations. All these larger municipalities need to organise the continuity of three vital services: district heating, operability of local roads, water supply and sewerage. The specific conditions are as follows:

- According to the District Heating Act, producers of the thermal energy whose estimated annual production volume amounts to at least 50,000 MWh, who operate in a network area with annual

sales total at least 50,000 MWh and who provide their service in the territory of a local authority that has at least 10,000 residents.[25]

- In the Public Water Supply and Sewerage Act it is stated that a water supply company that provides services in a local municipality with at least 10,000 residents and provides services through the public water supply and sewerage system, to which at least 10,000 residents are connected, shall be a provider of the vital services specified in clause 36 of the Emergency Act.[26]
- The Building Code states that the company that maintains a local road and that operates in a densely populated area in the territory of a local authority that has at least 10,000 residents, is deemed a provider of the vital service referred to clause 2 of subsection 4 of section 36 of the Emergency Act. [27]

The local municipalities with over 10,000 inhabitants that fall into the unmentioned classifications are obligated to work out HOLP-s for these services. Doing these plans is often delegated out to the (private) service providers (except for usability of roads, which always remains to be planned by the local municipality on its own).

2.2.4 Maturity of crisis preparedness in local municipalities

In 2020, the RB did an assessment regarding the crisis preparedness survey of local municipalities. The results, i.e. how well local municipalities are prepared to handle of the crisis and contribute to security, are available on the website of the Ministry of Finance - “Minuomavalitsus.ee”. In total, there were 55 indicators in the evaluation, based on which local municipalities were able to achieve either a basic, advanced or exemplary level. 54 local municipalities were assessed at the advanced level, 11 reached the basic level and seven remained below the basic level. The general level of crisis preparedness of local municipalities is 6 (on a scale of 0-9). See also Figure 17 in section “Stakeholder mapping” for map of the results by local municipalities. Throughout the years, the ratings have become better – for example, the general level in 2019 was only 3.

From the assessment, the weakest parts regarding crisis preparedness and which should be improved are:

- Risk communication aimed at the population
- Business continuity in the event of a communication and power outage
- Consequences and analysis of a crisis or exercise
- Local municipality’s crisis management structure trainings
- Unified crisis management platform and the crisis area need a specific person to be in charge of in the local municipality.

2.3 Disaster loss management

2.3.1 What is a disaster loss?

Loss data accounting is currently in demand in all over the world. But due to the diversity of the purposes and the currently used data collection procedures, all the available databases cannot be combined into one.

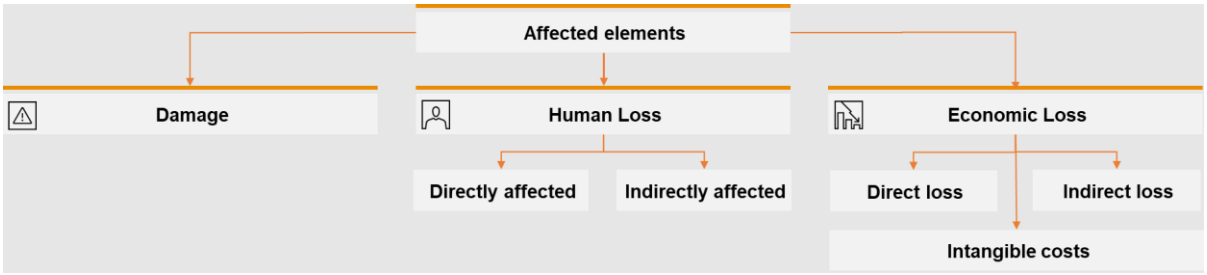
At European level disaster management has been addressed in some of the EU’s policies. For example, the European Union Solidarity Fund (EUSF) was established to support the countries that are affected by a disaster. The European Union Member States may qualify for the solidarity fund when the estimated losses due to the natural hazard are larger than €3 billion (as of 2002), or account for at least 0.6% of the GDP for that year, or 0.03% of GDP for regions. The Flood Directive calls for the establishment of the mechanisms to assess the risk of flooding in Europe and to provide room for

[25] Riigi Teataja, „Emergency Act“, published May 16, 2020, https://www.riigiteataja.ee/en/eli/516052020003/.
[26] Riigi Teataja, „Emergency Act“, in force January 1, 2022, https://www.riigiteataja.ee/en/eli/501122021001/.
[27] https://www.riigiteataja.ee/en/eli/520062017015/

disaster risk reduction. Flood risk assessments require information on past floods to establish the probability of flood impact occurrence.[28]

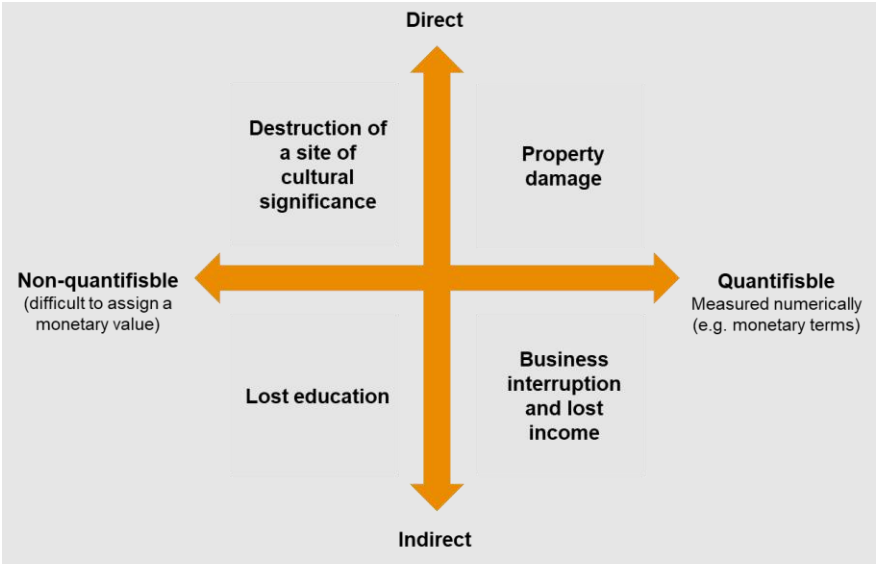
Most commonly, the disaster loss databases systematically account for human, physical and economic losses. **Human losses** typically include casualties, injured and displaced persons as a result of the disaster. **The direct physical damage** includes damage to buildings and civil works, is quantified by engineers and usually translated by economists into monetary loss. But direct physical damage also includes damage resulting from damage to the agricultural system and the natural environment. **Economic losses**, those that ensue from interruption of services and other economic activities, are usually grouped into three categories: **direct, indirect** (e.g. business interruption) and **macroeconomic effects** (e.g. loss of GDP). Most monetary loss assessments in post-disaster events consider direct economic losses that relate to physical damage assessment. (See Figure 12 and Figure 13)[14]

Figure 12. Damage and loss indicators[29]



There is a substantial difference between damage and loss terms. **Damage** is defined as the replacement/repair cost of totally or partially destroyed physical assets and stocks in the disaster-affected area. **Loss** refers to the changes in economic flows arising from the disaster (e.g., declines in output in crops, lost tourism activity due to environmental pollution event or economic impact of decline in trade due to the inoperability of transport infrastructure).

Figure 13. Visual representation of direct/indirect and quantifiable/non-quantifiable losses[30]



[28] T. D. Groeve, K. Poljansek D. Ehrlich, „Recording Disaster Losses: Recommendations for a European approach", Joint Research Centre – Institute for the Protection and the Security of the Citizen, 2013, https://reliefweb.int/sites/reliefweb.int/files/resources/lbna26111enn.pdf
[29] JCR Science and Policy Reports, „*Guidance for Recording and Sharing Disaster Damage and Loss Data*", 2015, *p.7.*
[30] PreventionWeb, "UNDERSTANDING DISASTER RISK. Direct & indirect losses", https://www.preventionweb.net/understanding-disaster-risk/key-concepts/direct-indirect-losses.

A physical damage assessment is used by governments and donors to address emergency and reconstruction needs, and to settle insurance claims. Long-term economic losses, due to the interruption of economic services and impact to the economy, are more difficult to estimate and they result in very variable estimates with high uncertainties. Loss data are generated through the systematic loss accounting based on the pre-defined methodologies. Each loss database relies on a given procedure.[31]

2.3.2 Calculation of disaster loss

In a 2014 report published by the OECD, it is mentioned that the calculation of the disaster cost normally faces three issues worldwide. Firstly, countries normally do not have a central repository for collecting the disaster loss data. Since spending is done at different levels of the government, such as ministries, agencies, etc., they each have their own way of distinguishing the hazards and the type of risk reduction investment they think is useful to be used. Secondly, an international problem is that countries do not have a standardised accounting of economic losses, which makes the data incomparable with other countries. And thirdly, there is no systematic way to count private investments with the public ones. Private sector efforts are calculated approximately and are being paid for through the insurance premiums.[32]

Figure 14. Disaster loss assessment process[33]

Disaster loss accounting is the principal motivation for recording the impact of hazards and aims to document the trends. Loss accounting also allows for spatial comparison. The information should be available at different levels: decision makers at local level (i.e., mayor as responsible for the risk mitigation measures); at the subnational level; at national level for fund allocation, for addressing disaster reduction, and for mitigation; and at the international level for the international financial and humanitarian aid.[14] The primary goal of disaster risk management is to minimise future disaster losses and create resilient societies and economies. For the weather-related hazards, this is also a goal of climate change adaptation. To make informed decisions about the costs and benefits of such measures, advanced science and effective risk-aware policy need to go hand in hand. Both science and policy need an accurate loss and damage information as an evidence base. Loss and damage data are not only relevant at national level (for monitoring aggregate national risk), but also at local municipality level (for implementing measures).[34]

2.3.3 Disaster loss in Estonia

Today, there are no legal requirements in Estonia which obligate different government institutions to gather disaster loss data. Consequently, most government institutions (and local municipalities) do not do much related to disaster loss data management. So far, everything that has been done only accounts for the direct costs of clearing certain disaster events for the state authorities

[31] T. D. Groeve, K. Poljansek D. Ehrlich, „Recording Disaster Losses: Recommendations for a European approach", Joint Research Centre – Institute for the Protection and the Security of the Citizen, 2013, https://reliefweb.int/sites/reliefweb.int/files/resources/lbna26111enn.pdf.
[32] Organisation for Economic Co-operation and Development, "Improving the evidence base on the costs of disasters to inform better policy making for disaster risk management: toward a framework for accounting national risk management expenditures and losses of disasters", https://www.oecd.org/gov/risk/issues-paper.pdf.
[33] Emergency Management, "Australia *Disaster loss assessment guidelines*", *p.11*.
[34] T. De Groeve, J. Mysiak, R. Schwarze, R. Swart, J. Semenza, V. Kendrovski, K. Kramer, E. Ivits, W. Vanneuville, L. Carrara, V. Blauhut, M. Erhard, M. and T. Christiansen, "Chapter 4.2: Disaster loss data in the European Union", European Commission, published 2017, https://publications.jrc.ec.europa.eu/repository/handle/JRC104158.

(the seven authorities responsible for the emergency response and ministries) and does not account for broader damage, such as cost to other assets holders, displaced population, loss of economic activity due to disruption, etc. Furthermore, not all authorities have even tried to quantify their own costs.

The COVID-19 pandemic **has underlined a need for the disaster loss data management in Estonia.** When considering the impact of COVID-19 policy measures, some ministries, namely the MoEC, the Ministry of Culture (MoC), and the MoS used pre-emptive approach to estimate how much budget allocation is needed to support businesses and culture facilities that have been closed due to COVID-19 or how much excess unemployment benefits needs to be paid.

Based on the requirements of the European Flood Directive, the Ministry of Environment (MoE) has also made attempts to calculate the flood loss data.

3 Current Processes

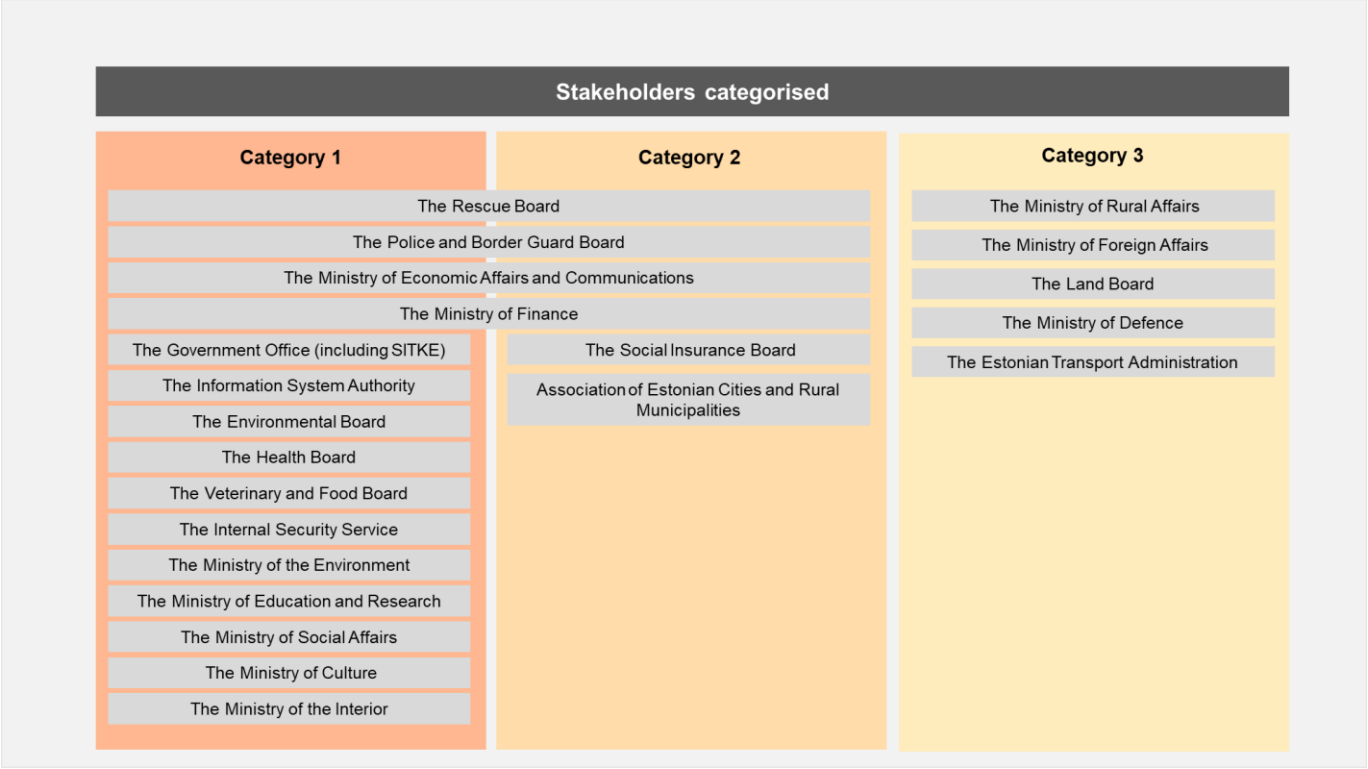
3.1 Stakeholder mapping

National crisis management is a wide policy area that requires contributions from numerous government authorities. We established our stakeholder mapping criteria in close contact with the GO. Our direct stakeholder engagement involves eight local municipalities out of 79 and numerous government authorities.

Government authorities considered important stakeholders for this Project fall into three categories (some are represented in more than one category at a time, see Figure 15):

- **Category 1:** Stakeholders who are directly involved in or influence the national crisis management system and should be **involved in the future disaster loss data management system**. Interviews were conducted with most of these authorities.
- **Category 2:** Stakeholders who are directly supporting the **risk management of local municipalities** or are in other ways more often in direct contact with the local municipalities. These are authorities that support crisis and risk management activities in local municipalities or are somehow involved in building resilient and continuous local services.
- **Category 3:** Stakeholders whose responsibilities and involvement in the risk and crisis management is mainly **indirect** – e.g., providing data and early warning systems.

Figure 15. Involved stakeholders categorised



3.1.1 Government Office and emergency resolution authorities

The main roles of the GO and seven emergency resolution authorities has been presented earlier, see section “Estonian overall risk and crisis management system overview”.

3.1.2 Government Office Situational Centre (SITKE)

A dedicated subteam of the GO's National Security and Defence Co-ordination Unit, named Situational Centre (SITKE), is acting as the centre point for the crisis information sharing. SITKE collects and processes information from various sources and shares the situational information among the GO, ministries and government authorities. Recently, they have made the information streams also available for local authorities. However, as the system is relatively new, not all authorities and local municipalities have yet joined the system.

Figure 16. Sharing information through the SITKE

3.1.3 Local municipalities

Since there are 79 different municipal units in Estonia, which differ in size, population, capabilities and situation and it would not be reasonable to involve all of them in the Project, a representative selection of eight local municipalities was made. These municipalities will be involved directly in the Project. The main criteria for choosing the municipalities were the following:

- **Population**: In order to avoid designing a methodology that is either too detailed (more suitable for large municipalities with high capabilities) or too simplistic (more suitable for small municipalities with low capabilities), the sample should involve municipalities with various population sizes. As the responsibilities of municipalities are different depending on the size, municipalities both with over and under 10,000 people were included in the sample.
- **Location:** In order to make sure that different location-based risk events are represented, municipalities from various locational environments were involved. For example, areas that are more likely to experience floods (both sea and river floods), risks related to migration and border issues (border region areas, including land or river/lake border, ports, and airports), areas more likely to experience forest fires, areas that are secluded and difficult to reach (islands and rural areas).
- **The crisis preparedness rating given to them by the RB** (as presented in *minuomavalitus.ee*). In order to avoid designing the methodology in a manner that only helps the ones that are the least capable or designing too complex methodology that is not usable for those whose maturity is lower, municipalities from the entire capabilities spectre were included (both "very good" and "under the base level" ratings are represented). See details on the rating composition in Appendix 5.

- Detailed overview of the municipalities in the sample can be found in **Error! Reference source not found.**Table 2 and the location of the municipalities can be found on the map below (Figure 17).

Table 2. Local municipalities in the sample

Name of the municipality	Description	Reasoning for the choice	Insight from first interviews
Alutaguse	**Alutaguse municipality** has 4,658 citizens. Its area is 1,465 km^2.[35] **The RB has given their crisis preparedness an overall rating of 6**. There are no people in the crisis management structure who have completed at least one crisis management training that ends with the assessment / application of the acquired knowledge. There is also a missing reference to the "be ready" app and local municipality guidelines on how to act during a possible crisis episode on the website. Based on the analysis, The Crisis Committee has not carried out an analysis based on the Emergency plan. [36]	Border municipality, a lot of forest, small population but big area	Alutaguse has hired a geoinformation specialist, who has created a map (of different data layers) with information which would be helpful in a crisis situation and risk management, such as the location of the fire water intakes, floodplains, areas of the cow parsnip colonies. It is worth mentioning that Alutaguse has not been involved in other authorities' HOLP-s.
Hiiumaa	**Hiiumaa municipality** has 9,454 citizens. The island is 989km^2 and it has a coastline of 326 km. This means they have the higher crisis risks of stronger winds, flooding and storms that could disrupt traffic between the mainland and the island. **The RB has given their crisis preparedness an overall rating of 5**. There is a lack of much public information regarding the possible crisis. There is no risk communication on the topics regarding the readiness for emergencies. What is more, people belonging to the crisis management structure have not completed crisis management training, nor are there partner institutions in the form of vital service providers.[37]	Next to the sea, small population	Hiiumaa is currently making a position for specialist whose duties include crisis management and prevention. The aim is to have a person who is not a politician and so there would always be one person with the right knowledge, even when the local municipality changes.
Loksa	**The city of Loksa** has 2,606 citizens. Its area is 3.82 km^2. [38] **The RB has given their crisis preparedness an overall rating of 2**. Loksa does have a Crisis Committee and the crisis information is available on the website. They do not have the crisis management	Low rating (2), small population	Overall, due to its small size and quite "safe" location, Loksa is not doing much regarding the crisis/risk prevention.

[35] Alutaguse vald, "Uudised ja teated", https://www.alutagusevald.ee/.
[36] Rahandusministeerium, "Alutaguse vald", https://minuomavalitsus.fin.ee/et/kov/alutaguse-vald.
[37] Rahandusministeerium, "Hiiumaa vald", https://minuomavalitsus.fin.ee/et/kov/hiiumaa-vald.
[38] Loksa Linnavalitsus, "Uudised ja teated", https://www.loksalinn.ee/uldinfo.

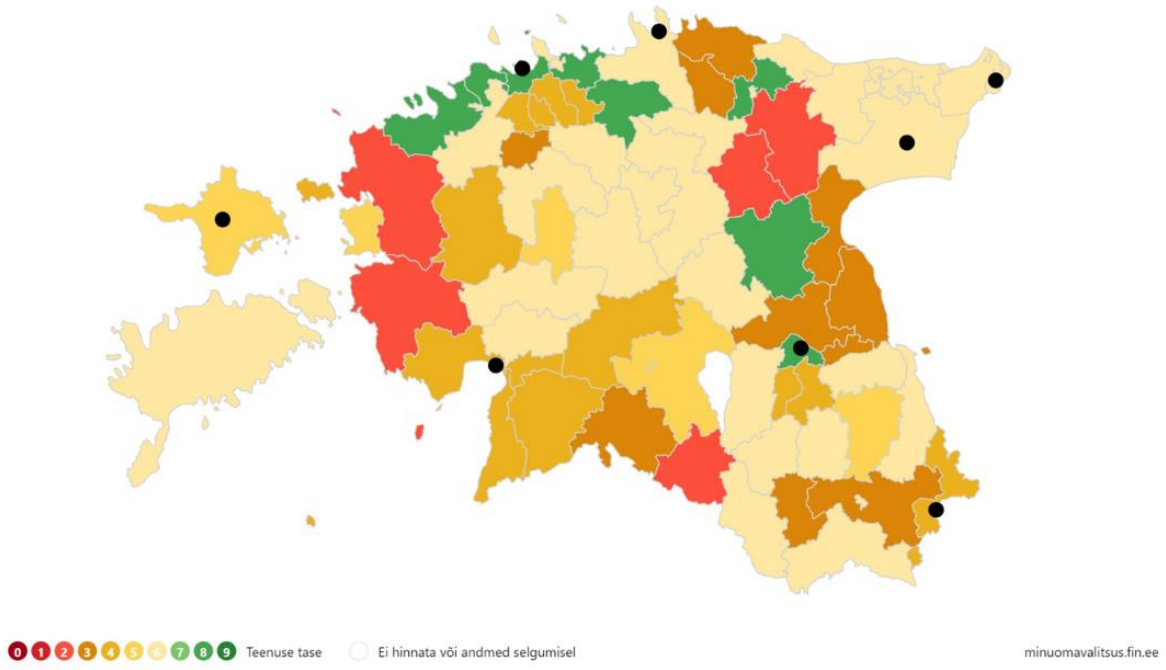
Name of the municipality	Description	Reasoning for the choice	Insight from first interviews
	system in place, people in the crisis management structure who have completed at least one crisis management training that ends with the assessment / application of the acquired knowledge and emergency plan.[39]		
Narva	**The city of Narva** has 55,905 citizens, out of whom 36% have a Russian citizenship and 48% have an Estonian citizenship.[40] The area of the town is 84.54 km^2. It is one of the border cities of Russian border. **The RB has given their crisis preparedness an overall rating of 6.** They have an active Crisis Committee and a separate staff member has been appointed to co-ordinate the crisis topics. They still lack trainings, regular crisis management exercises. The Extent of evacuation points is assigned to only 2-5% of the population. [41]	Border municipality, large population	The Crisis Committee includes representatives of vital service providers, different government authorities and larger local companies. They also have a specialist who works with the crisis management and prevention.
Pärnu	**The city of Pärnu** has 51,506 citizens. The area is 32.22 km^2. It is located on the coast of Pärnu Bay which gives them the higher risks of floods and strong windstorms. **The RB has given their crisis preparedness an overall rating of 4**. They have an active Crisis Committee but lack especially trained crisis specialists, regular crisis management exercises and evacuation points.[42]	Next to the sea, large population	Pärnu has created a system as HOLP-s, where duties of different parties are described in a crisis (instead of describing what exactly needs to be done). They also have made a crisis management manual for themselves. Moreover, they have made several changes in the city's master plan – in order to avoid floods and other crisis situations.
Tallinn	**Estonian capital Tallinn** has 443,920 citizens. Its area is 159.3 km^2. It is situated on the shore of the Gulf of Finland on the Baltic Sea, which opens it up to the stronger winds and storms. **The RB has given their crisis preparedness an overall rating of 8.** The	Large population (one third of the whole population of the country), high rating (8)	Tallinn has a special crisis group consisting of five people. The crisis group deals with mainly crisis regulation and prevention. They also have made a very thorough risk analysis for the city (in 2016, and plan to

[39] Rahandusministeerium, " Loksa linn", https://minuomavalitsus.fin.ee/et/kov/loksa-linn.
[40] Narva Linnavalitsus, "Narva arvudes 2020", https://www.narva.ee/documents/29877749/31137183/Narva+arvudes+2020+EST.docx/a011c45d-97ab-42ab-897e-47d18c13ee3a.
[41] Rahandusministeerium, "Narva linn", https://minuomavalitsus.fin.ee/et/kov/narva-linn
[42] Rahandusministeerium, "Pärnu linn", https://minuomavalitsus.fin.ee/et/kov/parnu-linn

Name of the municipality	Description	Reasoning for the choice	Insight from first interviews
	only thing they are lacking is the Extent of evacuation points – it is assigned to only 2-5% of the population living in the area.[43]		renew it during the ongoing year). What is more, they constantly do risk analysis and business continuity plans for vital services.
Tartu	**The city of Tartu** has 95,326 citizens. Its area is 38.8 km^2. **The RB has given their crisis preparedness an overall rating of 8**. The only thing that Tartu is lacking is regular crisis management exercises.[44]	Large population, high rating (8)	Tartu has a special position for a specialist who deals with crisis prevention. Tartu has made a climate plan on its own. They are constantly monitoring and making changes in the city master plan if needed (flooding, car ownership, etc.). They also carry out performance audits of vital services to identify risks.
Setomaa	**Setomaa municipality** has 3,291 citizens. Its area is 463.2 km^2.[45] **The RB has given their crisis preparedness an overall rating of 4.** They have an active Crisis Committee and crisis management system. They are lacking trained crisis specialists, regular crisis management exercises and crisis communication on websites and to locals. [46]	Small population, a border municipality, a lot of forest	Setomaa has been involved in HOLP-s at least to some extent — e.g. in the mass immigration hub. A representative of the RB, the PBGB and the Defence League is involved in the Crisis Committee.

[43] Rahandusministeerium, "Tallinna linn",https://minuomavalitsus.fin.ee/et/kov/tallinna-linn
[44] Rahandusministeerium, "Tartu linn", https://minuomavalitsus.fin.ee/et/kov/tartu-linn
[45] Setomaa vald, "Setomaa valla uudised ja teated", https://setomaa.kovtp.ee/
[46] Rahandusministeerium, "Setomaa vald", https://minuomavalitsus.fin.ee/et/kov/setomaa-vald

Figure 17. Ratings of different municipalities in Estonia and location of the sample municipalities involved in the Project (marked with a black dot)



3.2 Overall structure of risk and crisis management in local municipalities

Different municipalities approach risk management very differently and there are various risk and crisis management activities taking place in local municipalities. The most common risk management activities in local municipalities are as follows:

- Local Crisis Management Committee activities (risk assessment and planning, reporting)
- Regional Crisis Management Committee participation (information sharing)
- Trainings and emergency exercises (awareness, learning and co-operation)
- Risk assessments done during the strategic planning (such as area master plans, climate plans, etc.)
- Ad hoc risk control or mitigation activities (e.g., securing power generators).

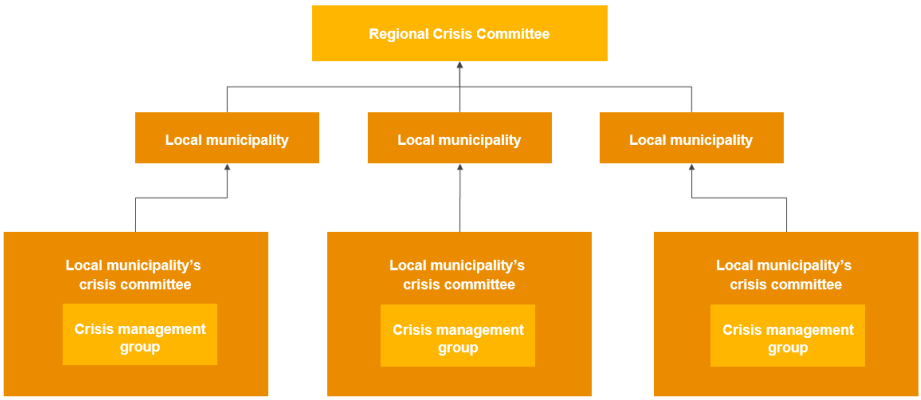
The closest partner to all the municipalities in crisis management is the RB. They give the guidance to the municipalities, check that the municipalities have given in their emergency plans and conduct trainings and exercises with the municipalities. The RB is also responsible for making sure that all municipalities have finished their crisis committee annual work plans on time.

3.2.1 Crisis committees

There are three levels of crisis committees and groups:

- Regional Crisis Committee
- Local municipality Crisis Committee
- Local crisis management group (in most municipalities, it is created for active acute crisis management; some larger municipalities may also have designated a person or a team whose task is to carry out crisis management tasks) (see Figure 18 below).

Figure 18. Different crisis management committees in local municipalities



Local crisis committees and crisis management groups

All local municipalities must organise their own **local crisis committees**. This requirement comes from the Emergency Act.[30] These committees are required to meet regularly and discuss potential issues that can impact the municipality negatively. Crisis committees usually involve local government office, department heads, representatives from RB and PPGB and representatives of vital service providers in the municipality. The chairman of a Crisis Management Committee of local authority is the rural municipality mayor or the city mayor who approves the composition of the Crisis Management Committee.

The responsibilities of a Crisis Management Committee of local municipality include the following:

- Co-ordinating the crisis management within the local authority
- Submitting to the regional Crisis Management Committee annual summaries of the activities of the C**risis Management Committee of the local authority and the schedule of work for the next year**
- Performing other duties arising from the law and its statutes.

The risk management processes of local crisis committees are presented below in in chapter 3.4 page 35.

Once there is an acute crisis situation, specific **crisis management groups** (*kriisistaap)* are organised on an *ad hoc* principle, involving the specific people who need to contribute into the specific crisis management.

Regional crisis committees

Additionally, local municipalities can group together and establish regional units which deal with risk and crisis management issues in a united manner. For example, Saku and Kiili municipalities have made a joint crisis management committee, in which they have made joint HOLP-s, evacuation plans and risk analysis. According to the Emergency Act, **four permanent regional crisis management committees shall be formed** for the purpose of organising co-operation between the local authorities of executive power and local authorities in preventing, preparing for, and resolving emergencies.[47] The composition, rules and procedures of the regional crisis committees are established by a regulation of the Government of the Republic. The RB is responsible for organising the regional crisis committees. The regional crisis committee serves an environment for sharing information between the local authorities and all relevant governmental organisations (including authorities that are not responsible for the emergency management).

[47] Riigi Teataja, „Emergency Act“, published December 1, 2021, https://www.riigiteataja.ee/en/eli/501122021001

The purpose of the regional crisis management committees is:

- to consult local authorities in organising crisis management
- to organise co-operation between the authorities of executive power and local authorities in preventing and preparing for emergencies
- to support the authority co-ordinating the resolution of an emergency in organising information exchange, situation awareness and co-operation in case of emergency risk and in resolving an emergency (including the introduction of all government authority HOLP-s and the role of local municipalities in them).

The Crisis Committee has regular meetings throughout a year, but if the situation requires, additional special meetings are organised. For example, due to COVID-19 pandemic regional crisis committees started meeting on weekly bases.

The risk management processes of regional crisis committees are presented below in chapter 3.4.

3.3 Overall structure of national disaster loss data management

Estonia does not have a disaster loss data management system at the centralised level. Where any attempts to calculate any disaster losses are made, the ministries and government authorities collect and analyse data on their own. The outcomes are reported occasionally back to the co-ordinating ministry that might report it to the GO – either for policy making purposes or for creation a central understanding of the situation in the country.

Some efforts of calculating the potential impact of COVID-19 pandemic and the cost of COVID-19 restrictions have been made over the recent years and the details of the process are described below, on page 45. Another exception of calculating disaster loss has been made by the MoE that fulfils the requirements of the European Flood Directive. More detailed overview of the process can be found on page 42.

3.4 Risk management processes in local municipalities

Risk and crisis management efforts in municipalities are different and depend on the capabilities, motivations and approach of the municipality in question. Overall, larger municipalities that have access to the greater number of resources, have also put more efforts into crisis and risk management. Although the extent of crisis management can vary, certain processes are similar in all municipalities. In the following chapter we will give and overview the general processes that guide the risk awareness in the local municipalities.

3.4.1 Regional crisis committees

Regional crisis committees are information sharing environment among the regional municipalities and state officials. They are a platform for the state authorities to communicate their expectations to the municipalities and give an input for raising the risk awareness. The process mapping can be found in the table below.

Table 3. Role of regional crisis committees

Risk awareness from regional crisis committees

Activities	• Introductions of HOLP-s by the seven responsible emergency management authorities • Sharing of other relevant information by state authorities either during (online) meetings or through materials shared via emails • Discussion of relevant issues in the region • Sharing best practices among the municipalities • Organising co-operation agreements	
Process participants	• Regional municipalities (previously some municipalities that are not vital service providers in the context of HOS were not included, but as the COVID-19 pandemic highlighted the need for a common information sharing platform, currently, all of the municipalities have a chance to partake in these meetings) • Seven emergency management authorities • Other state authorities that need operational information sharing channel with the local authorities	
Data streams	**Data input**: • Information from state authorities • Information from municipalities	**Data output:** N/A

3.4.2 Regulatory requirements (local crisis committees, local vital services)

While attendance in the regional crisis committee is voluntary, there is a specific regulatory requirement in place for local municipalities. Namely, to establish a local crisis committee and, in certain cases, assure the provision of the certain local vital services.

For municipalities with less than 10,000 people, the only obligation is to establish a crisis committee (see the process of local crisis committee below). Larger municipalities with more than 10,000 inhabitants need to assure the continuous provision of vital services as well. The 33 municipalities with more than 10,000 inhabitants need to establish HOLP-s regarding the ensuring of the local roads' operability. As for district heating, and water supply and sewerage, the HOLP-s must be made by only those service providers that are classified as vital services providers (previously defined in chapter 2.2.3)

All these legal requirements are fulfilled by the local crisis committees. Process of creating risk awareness is presented in the table below.

Table 4. Role of local crisis committees

Risk awareness from local crisis committees	
Activities	**In all municipalities**: • Establishing an annual crisis committee work plan and presenting the plan to the RB. While establishing the annual plan, evaluate vulnerable areas and budgetary opportunities for investing (both municipality budget and other available funding) in order to build the resilience. For example, buying mobile electricity generators • Getting feedback and recommendations form the RB and, if needed, reacting accordingly • If needed, establishing or reviewing continuity risk assessment and plan of vital services providers. However, even the municipalities that are not legally required to take a risk-based approach, vital services carry out activities that help to increase resilience either at the encouragement of the RB or as a part of general management

	and being able to fulfil the general obligations of local authorities (established in the KOKS) **In municipalities with higher awareness:** • Discussion of risks, most likely to influence the municipality • Writing down the emergency management plan. The level of details varies. Some municipalities have established a list of generic tasks which must be carried out and assigned responsibilities to the specific personnel. Other municipalities have just listed the responsible people and rest of the planning will be done ad hoc
Process participants	**In all municipalities**: • Head (or deputy) of the municipality • Department heads of municipality government • Representatives of the RB • Representatives of the PBGB • Service providers of vital services **Additional stakeholders involved in some municipalities (examples):** • Representatives of academic institutions (Tartu) • Representatives of hospitals (Tartu) • Representatives of the Estonian Defence League • Representatives of local businesses who could help in crisis situation
Data streams	**Data input:** • Information from regional crisis committees • Information and perspectives from committee members • Input from regular municipality council meetings • Input from service providers **Data output:** • Annual plan and report • Continuity assessment and plan for vital services • Emergency management plans and/or list of responsible personnel and relevant contacts • Evacuation plans

3.4.3 Trainings and exercises

Most local municipalities have trainings for their crisis committees to be prepared and more aware of the possible risks. As it was also mentioned before, the main authority that co-operates with the local municipalities regarding trainings is the (local) Rescue Board. Overall, trainings are done both from the initiative of the local municipality and from the initiative of other authorities (mostly the RB or the PBGB).

Trainings and exercises tend to be the most useful way of identifying current places of concern regarding the risk management. For example, Tartu had a crisis exercise in 2019 which involved a scenario of a cyber-attack. From the exercise, they found some shortcomings in their system and in their preparedness regarding crisis management. On the same year, they faced a real cyber-attack on their bike-sharing database. Due to the experience gained from the exercise, they were more prepared and efficient in solving the situation.

Table 5. Trainings and exercises

Risk awareness from crisis management trainings and exercises		
Activities	• Crisis management workshops and trainings • Crisis management exercises	
Process participants	• Various, depending on the focus area, risks, organisers • Mainly driven by the RB and the PBGB	
Data streams	**Data input:** • Training/exercise materials	**Data output:** • Learning points and key takeaways

3.4.4 Strategic planning

For some municipalities, the risk management is not just something to consider when dealing with crisis management. These municipalities have realised that the risk management is an important aspect to keep in mind in general planning and policy decisions as well. Often, the risk mapping and assessment activities are triggered within the wider strategic planning processes. Few examples of such risk management are following:

- Pre-emptive consideration of the risk from the environment in zoning decisions and apply measures that can reduce the impact of potential risk events. For example, most of the local municipalities do not allow new buildings to be built on a certain distance from the sea/lake/river. Some municipalities have done even more: e.g., while making new parks, the city council has discussions with the local police department to make sure that there would be no areas where the potential gangs would start to gather. Pärnu, where floods are likely to happen, has located electrical switchboards quite high, so that even if the sea levels start to rise, the systems are less likely to be flooded and could maintain the functioning.
- Taking a risk-based approach to the long-term strategy documents and development plans. Tartu is a good example for that: as of right now, Tartu has made a special climate plan to make more climate-aware decisions and to lower their impact for the future risks. Their goal is to be a climate-neutral city by the year 2050. During the compilation of the climate plan various climate related risks were mapped and addressed.

Table 6. Risk awareness from strategic planning

Risk awareness from general strategic planning activities	
Activities	• Policy design and discussions • Policy analysis • Impact analysis or risk analysis • Establishment of the long-term strategy and development plans
Process participants	• Local municipality government officials • Experts from other government institutions, if included • Outside consultants, if included

Data streams	**Data input:** • Statistics • Experience • Trends	**Data output:** • Strategy documents • Development plans • Policy decisions

3.5 Disaster loss data management processes

In 2019-2020, Estonia carried out its emergency risk assessment. During the emergency risk assessment authorities were required to calculate the financial cots of the emergency events. This was the first attempt to start using the disaster loss data, however, the authorities were not given any specific methodology or guidance how to carry out the disaster cost analysis. Since no exact methodology was proposed, all the authorities had to spend extra time on finding the most suitable one for them. Consequently, almost all authorities used different methodologies making the result incomparable. Moreover, due to the lack of a methodological approach, most of the cost estimations were made based on “gut feeling” and many of the financial calculations behind the estimations were never written down. **In most cases, these calculations were limited only to the authority’s own cost of equipment and employees to resolve the acute crisis situation**.

Another problem that was brought up by many interviewed stakeholders was that while everyone was doing their risk analysis and emergency plans, they were **focused on their own point of view**. Each authority outlined and listed in detail their own responsibilities in case of a risk event that they are in charge of, but the responsibilities of other authorities were laid out very broadly. It was often described during the interviews that supporting agencies agreed through the HOLP what their part was but did not take it further. Supporting agencies did not analyse how it would impact them and usually they did not follow up with establishing actual plans for neither carrying out their role nor analysing their capability caps and how to improve on them.

It was also highlighted that the **scenarios might have been looked at too narrowly**. Interdependencies, compounding risks and impacts were not effectively considered. For example, a large flood can happen in Estonia only in case of a huge storm – but a storm of this size will cause far more problems than just the flood itself. In the emergency plan, it was basically mentioned only how people in the flooded area must be evacuated, but besides that, there would be many other things to do. In case of such a big storm, the electricity would most likely go off, but since the RB is not in charge of dealing with the electricity, this issue was not even mentioned anywhere. Taking a narrow look at the risk analysis and management can lead to the plans which overestimate the actual capabilities available and leave the agency potentially unprepared for the full spectrum of the crisis.

Other than the emergency risk assessment process, Estonia has limited experience with the disaster loss methodology. The MoE is fulfilling the requirement of the European Flood Directive and is calculating the cost the potential floods could have, however, in Estonia, this has been limited to the mapping vulnerable areas and potential impacts of floods. A more detailed overview of the process can be found below. Moreover, during the COVID-19 crisis, the Government also tried to calculate the losses to be compensated to the businesses and people. Miniseries that were involved in the calculation process were the MoEC, MoC and MoS. More detailed overview of the process can be found below.

3.5.1 Ministry of Environment and flood loss data

The MoE has tried to collect some disaster loss data and calculate the impact of different flood areas and flood incidents that might happen in Estonia. The need for the calculations comes from the European Flood Directive. This Directive requires all Member States to assess if all water courses and

coast lines are at risk of flooding, to map the flood extent, assets and humans at risk in these areas, and to take adequate and co-ordinated measures to reduce this flood risk.[48]

The Member States should co-ordinate their flood risk management practices in shared river basins, including with third countries, and shall in solidarity not undertake measures that would increase the flood risk in neighbouring countries. The Member States should consider long-term developments, including climate change and sustainable land use practices, in the flood risk management cycle covered by this Directive.

In the documents provided by the MoE, it is seen that they have mapped the main areas where floods might happen (e.g. including Pärnu, Võiste, Häädemeeste, Virtsu, Kuresaare and Nasva, Kärdla, Haapsalu, Tallinn, Kiisa, Maardu, Paide, Kohtla-Järve, Tartu, Aardlapalu, Võru, Raasiku, Sindi). The list of the areas is renewed, e.g. the last two were added in 2017, whereas basically everything else has been on the list since 2011.

The MoE has also done specific calculations regarding the following aspects:

- S area's most important and influenced areas
- Potential financial costs if a flood would happen, categorised in:
    - amount of people in the area
    - costs to rebuild the area
    - costs of rebuilding per person
    - potential economic loss.

They have also mapped out scenarios of preventions from different angles:

- How much would a specific measurement of prevention cost
- What would be its alternative
- What would be the costs if nothing is done.

So far, the data and methodologies involving calculation of scenarios have been used (including data from the Estonian Environment Agency and Statistics Estonia (SE), overall other public statistics). If no data is available, then they use analogue methods and scenario modelling. They use available data comparison, co-operate with the Estonian universities and use insights from the different theses to produce more information.

The damage caused by floods can be conditionally divided into four categories:

1. **Direct material damage**

In the case of direct material damage, an additional sub-classification was made in order to delimit direct material damage based on the potential damage:

- Damage to buildings
- Damage to transport infrastructure
- Damage to public infrastructure other than transport infrastructure
- Damage to cultural heritage
- Damage to the environment
- Damage to industrial enterprises
- Damage to agriculture.

2. **Indirect material damage**

[48] European Commission, "The EU Floods Directive", published November 6, 2007, https://ec.europa.eu/environment/water/flood_risk/

Indirect material damage caused by floods can be classified as follows:

- Loss of income for companies
- Additional time spent on staff
- Additional costs for emergency assistance (rescue service, police, ambulance).

3. Direct non-material damage

Direct non-material damage is divided into sub-categories:

- Affected population
- Damage to human health, including deaths and injuries
- Environmental effects
- Destruction of cultural heritage.

4. Indirect non-material damage

Indirect non-material damage is classified into the following general sections:

- Impact on health and well-being (including stress and mental health)
- Impact on the sustainability of the living environment
- Deterioration in the availability of services.

Based on the distribution mentioned above, the occurrence of different risk factors was assessed based on the examples from the other EU Member States and a classification was developed to divide the risk factors into different damage types. In order to estimate the potential material damage, generalised formulas were prepared for the calculation of the damage caused to the buildings, the lost income of the companies and the additional time of the employees. The developed methodology was subsequently tested on the example of one risk area, which was the city of Pärnu.[49]

A great example of where they have used this methodology would be calculating the potential floods in the city of Tartu. They have calculated out several alternative scenarios regarding the potential financial costs of certain measures. For example, one of the districts which is more likely to have floods is Ülejõe. **The total cost of building several flood controlling measures would be €193,400 -** the measures would include acquisition of a new closing well (a total of five would be needed, with the total cost of €20,400), procurement of temporary water barrier (200m, total cost €115,000), procurement of mobile pumping station (total cost €54,000) and having research and design works (€4,000). **An alternative solution** would be to leave things as they are right now which **would cost in total up to €1,200,000** (the calculation is based on the total amount of people in the area that might be influenced by the floods (in this case - up to 65 people) and the total area of buildings that might be damaged (in this case - up to 1,100m^2 of living area and 2,500m^2 of outbuildings). In addition, **the extra costs of** accommodating people who would not be able to access their homes because of the flood can be up **to €45,000 a month**.[50]

Currently, the main shortcoming in getting data is regarding economic activity. The main issue is that the SE shares only generalised information (since detailed information regarding companies' activities cannot be shared due to the GDPR laws). The MoE and EB has tried to get access to the information straight from the private sector, however, these efforts have been unsuccessful so far.

The EB in collaboration with the Estonian Environment Agency is currently starting to build an ecosystem services assessment process. However, this methodology is yet to be developed. It is expected that it could be useful in calculating the disaster loss regarding natural environments, but currently there is still a lot of uncertainty regarding the system in development.

[49] Europolis "Riskipiirkondade üleujutusega seotud kahjude kirjeldamise majandusnäitajadja metoodika" 2018

[50] M. Viirmaa "Üleujutusriskide maandamiskava tehnilised lahendused Tartu linnas" 2021

Table 7. Disaster loss management process - floods

Disaster loss data management process regarding floods		
Activities	• Data and document collection • Data and document analysis • Calculations • Doing analysis on certain events • Doing analysis on certain locations	
Process participants	• Estonian Environment Agency • SE • LB • Local Municipalities • Universities	
Data streams	**Data input:** • Data from the LB • Data from statistics • Trends	**Data output:** • Strategy documents • Development plans • Policy decisions • Recommendations for municipalities in flooding areas • Reporting to the EC

3.5.2 Using the disaster loss calculations during the COVID-19 crisis

The MoEC, MoS and MoC have tried to gather some disaster loss data during the COVID-19 pandemic. They tried to forecast how much certain economic restrictions would affect different companies and industries and how much government support measures would be needed. For example, when setting the compulsory closing times of restaurants, how much economic difference would it make if restaurants had to close either 8pm or 11pm.

To calculate the impact of the potential measures different sources of data were being used. For example, the MoEC gathered data from both the private and public sector. The data used from the public sector included data from the Estonian Tax and Customs Board, the SE and data from other ministries and suborganisations. Few examples of data used were monthly turnover/tax information by companies/sectors from the ETCB (most up to date public sector data source), aggregated hourly payment card data from the Estonian Banks or financial information obtained directly from the specific sector companies.

In similar manner, the MoS and the MoC also tried to calculate which impact would certain measures have. The data they used was a bit different – for the MoC it was mainly related to the culture organisation revenue streams (e.g. events ticket information from private sector, ticket sales platforms), while the MoS focused on employment data and estimates (e.g. how many employees would either lose their jobs or would get their income deducted, so how much financial support should the government give to these employees or their employers to prevent the job loss).

The data from the private sector was mainly got from the different focus groups with, e.g., trade unions, or through talking directly to the companies which would be impacted the most.

Table 8. Disaster loss management - COVID-19

Disaster loss data management process during Covid-19 pandemic		
Activities	• Data collection • Predictions of COVID-19 trends • Impact analysis of policy measures • Cost calculation of measures	
Process participants	• GO • MoEC, MoS, MoC • Tax and Customs Board • Numerous state institutions • Trade Unions • Private companies	
Data streams	**Data input:** • Data from different government institutions • Data from private sector • Data from Trade Unions	**Data output:** • Government briefings and memorandums • Policy decisions • Support payments budget

4 Information system mapping

4.1 Local municipalities' risk mapping

There is no central system where the local municipalities could get the information regarding potential risks, current risk environment or operational crisis management. There is also no central system where the local municipality could store their risk assessments, analysis and contingency plans. However, there are numerous information systems which local authorities use, while assessing their risk in daily decision-making emergency planning or crisis management activities. Also, we have identified some information systems that are currently not widely used but may act as a logical place for hosting the methodology and guidance to be developed.

The main information systems/sources available for the local authorities are the following:

1. The Social Insurance Board of Estonia, social and demographic data

The SIB shares quite a lot of information with the local municipalities. For example, through their webpage, all local municipalities can find statistics about the age demographics of the people living here, how many of these people are retired and how many people are disabled. This way, the local municipalities can already take the demographics into account in case of a major incident occurs. Besides that, the SIB also shares information about unemployment and overall historic expenses on social welfare.[51]

2. The Land Board, geolocation information maps

All the topographic data and base maps can be found from their website. The topographic data includes details about forests, open areas, sea/lake/watercourse areas, swamps/bogs, etc. But they also go into more detail with various additional data layers. For example, from the risks perspective, the available and accessible data also includes areas of flood hazards, hogweed colonies, chemical treatment sites, heat areas, restrictions information system and water safety. [52]

3. The Statistics Estonia, overall statistics

The SE is the place where all types of important statistical information are gathered and shared. Different types of general information are used by the local municipalities, but there are two main issues with the SE data when it comes to the local municipality's risk mapping:

- The data available is too high level for municipalities and therefore becomes unusable in a specific crisis situation. For example, if Pärnu municipality would need to know how many restaurants are in the flood area, then getting this information from the SE would not be possible, since they could only provide the information about the whole municipality in general.
- Information renewal on the SE platform is relatively slow, since the collecting and processing national statistics takes time. Fast data transfer is extremely necessary during a crisis. With the example of the COVID-19 crisis, it became apparent that once the data is provided by the SE, it technically was already outdated. This was a very commonly mentioned issue from both local municipalities and different government authorities.

4. The Rescue Board, new learning platform

Most of the information the local municipalities obtain in relation to risks and crises is obtained through the regional crisis committees, conducted by the RB.

There is no information system yet in place to store all the information and communication exchanged with the RB. However, the RB is currently developing a special learning platform. The RB initiated the development of such platform as a response from the local municipalities, who indicated that there are already many responsibilities assigned to them centrally, but often these responsibilities do not come

[51] Social Insurance Board of the Republic of Estonia, „Statistika ja aruandlus“, https://sotsiaalkindlustusamet.ee/et/organisatsioon-kontaktid/statistika-ja-aruandlus
[52] Geoportaal, https://geoportaal.maaamet.ee/

with the specific instructions on how to deal with them and even if they get instructions, the helping materials are not centrally in one place, which means that important insight might often be left accidentally aside.

The platform itself is planned to serve two purposes: firstly, the RB wants to use this platform to conduct certain crisis trainings with the local municipalities, and secondly, they want the platform to have learning materials for the local municipalities, so that the platform would be useful to the local municipalities even outside the trainings. There are numerous risk-management-related materials which are still in progress or planned to be made for this platform – such as materials for dealing with interruptions in case of vital services, instructions for preparing a risk assessment and instructions for conducting the emergency exercises.

As of right now, the funds for the development of this Project are limited due to the Project size and two parallel development streams (trainings and methodological assistance). Once the platform is ready, it will be given over to the IT and Development Centre of the Ministry of the Interior which has expressed the interest in continuing the development of this platform and has more funds to invest in it in the future.

5. GO SITIKAS, crisis situation information exchange

The GO subteam SITKE has launched an information sharing platform called SITIKAS. It gathers information from the different authorities, municipalities and media outlets. In order to access SITIKAS, you need to be granted a permission. All local municipalities are allowed to use SITIKAS, but so far only two municipalities have started to use it.

Different authorities are given different types of permissions to what information they are allowed to be accessed. As of right now, SITIKAS sends out daily and weekly reports regarding the crisis situation in Estonia. The reports also include the current level of preparedness of different government authorities for a crisis. Mainly, the information that is shared through SITKE is a traffic light system based on the overview of the current situation in different areas (such as healthcare, environment, national defence and many others).

6. Minuomavalitsus, local municipality's service level information

The Ministry of Finance manages a platform Minuomavalitsus where the local municipalities (and its citizens) can compare themselves to other municipalities (which might motivate them to do more). For this, hundreds of criteria are being shared in a systematised overview about the quality of services provided by the local municipalities in different dimensions. The site enables to get an overview of the state of services and development possibilities in each local municipality to direct local development based on this information; compare the local municipalities' service levels which contribute to the sharing experiences; raise public awareness about the organisation of local services and increase citizens' informed involvement in the discussing local priorities.[53] Among other things, the site also hosts the results of the RB's assessment at local municipalities' crisis preparedness level.

7. Estonian Academy of Security Sciences, learning platform

The Estonian Academy of Security Sciences has made several special learning programmes for different authorities, including the local municipalities. The programme is divided into eight chapters: General Basics of Crisis Management, Legal Basis of Crisis Management (including the laws, special procedures), Prevention and Risk Management, Preparation, Crisis Management, Crisis Communication, Vital Services, and International Crisis Management.

Moreover, there are additional detailed courses regarding risk and crisis management for advanced users. The need for basic and further training has been identified in co-operation with the Rescue and Crisis Management Policy Department of the Ministry of the Interior. These trainings are related to the implementation of the Emergency Act and the performance of duties arising from the Act.

[53] Rahandusministeerium, " Üle poole Eesti töökohtadest asub Harjumaal", December 20, 2021, https://minuomavalitsus.fin.ee/.

8. Local information systems made by the local municipalities

Some local municipalities have created their own information systems which they use in risk management activities on a daily basis. For example, Alutaguse has created a layer of maps where the key areas are listed with the intention of risk mapping and finding certain areas (e.g. fire water intakes) as quickly as possible during a crisis situation. Another example is Tallinn where the local municipality has made a common information sharing system on SharePoint which all representatives of all city districts could access and get information from.

It is important to note that many local municipalities have mentioned during their interviews that the main source of information about risks and crisis is actually derived from local communications with the population (smaller municipalities) and the Estonian media and news. The media is often the place where they get the fastest relevant information about the situation or area.

4.2 Disaster loss data management system

Overall, no disaster loss data is centrally collected as of right now and there is no information system for this. Any disaster loss data collection attempt so far has been from a single authorities' point of view, and the information has been stored only in their own data storage places (often just in a separate file or email box).

Data in relation to the potential costs of COVID-19 measures was collected at the government level, but no specific information system was used. It was handled as any other information used for decision making.

5 Constraints mapping

5.1 Constraints of local municipalities' risk management and crisis management

Table 9. Constraints of risk and crisis management

No	Observation
1	**Legal**
1.1	**The current regulation of the municipality's role in the crisis preparedness is not precise enough.** It should specifically require the 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 the national defense emergencies, they are not even informed about 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 the HOLP creation either, but at least in most cases they are informed of the outcome through the regional crises committees.
2.2	**Lack of commitment from 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 the value in investing in preparedness.
2.3	**Unclear responsibilities of local municipalities in crisis management**. Numerous parties solve their aspects of crisis, however, co-operation is limited, and HOLP-s are vague when it comes to the municipality's role. Unclear responsibility also leads to the freeride effect and allows municipalities not to pay attention to crisis management.
2.4	**Lack of commitment from 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.
2.5	**The speed of changes in the staff of a local municipality affects risk assessment processes.** The changes in the local municipality can happen often, based on the election cycle, sometimes due to the political instability even more often than once in four 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 previous risk planning activities are not documented in a structured way, so the basis for continuing 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 the attention if there has been a crisis, but if nothing has happened during the decades in power, there is a lack of motivation for increasing preparedness.
2.6	**Size and recourses available matter**. Most local authorities are too small to effectively afford to pay attention to emergency preparedness. However, the size or resources 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	**Most municipalities feel that 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 that the risk mitigation priority setting initiatives at the state level should come together with

No	Observation
	sufficient additional funding. For example, during COVID-19, 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 it all together, a risk analysis on paper (or buying a ready-made risk assessment) does not help local authorities or make them to think through risk events**. A new approach must trigger internal analysis. Crisis management exercises are considered the most effective tool by many stakeholders.
2.9	**Examples of not valuing the proactiveness of the local municipalities on crisis management.** If municipalities take the proactive initiative, these should be valued at 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 the local municipalities regarding the businesses that do not follow COVID-19 guidance and should be sanctioned or closed. The Ministry of Education overruled decisions of the municipalities 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.
3	**Operational**
3.1	**Duplicating communication.** When state institutions need the information from local municipalities the questions are not co-ordinated – the same information is asked from the various sources (from municipality government but also from its institutions) duplicating the work done. Duplication also happens when different state institutions give the 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 do not tend to admit that there are things they should do but cannot.
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 good shape.
3.4	**Risk analysis focuses on one risk (or location) at a time.** Interdependencies of different events and services (e.g., storm with blocked roads also in other neighboring municipalities, loss of electricity and, thus, also heavily affected other services) are currently rarely considered. Municipality's focus is within its own borders, there could be a need to keep in mind the potential risk events from other municipalities and how it could influence the referent municipality.
3.5	**Resources available to solve the crisis may not be adequate for the complex crisis.** State level and municipalities may rely on the same assets, which means that 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 prioritisation is often not considered in advance.** For example, municipalities say that they have bought (usually one-three) 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 the priority. The lack of priority use areas also applies to the 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 based on the experience or belief rather than data-driven.
4.2	**Data accessed freely through SE is too general for municipalities.** Municipalities have access to the county level information, but there are different municipalities in one county. Asking for specific information regarding the municipality is too expensive.

5.2 Constraints of emergency level risk assessment and management system

Although the improvement of state level risk assessment principles is not in the scope of the current Project, the disaster loss data management system cannot be effective outside the emergency risk assessment system. Thus, the overall effectiveness of the risk assessment system has direct impacts on the efficiency and value of the disaster loss data management. Therefore, we highlight below some of the key improvement areas for the national risk management system as a whole.

Table 10. Constraints of emergency risk assessment

1	**Legal (the 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 co-ordination with the different stakeholders. Thus, improving the emergency risk assessment and its co-ordination across stakeholders may need the additional resources or personnel.
2.2	**In the risk assessments the authorities dealt with their own risks separately**. The coordination 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 bodies for which crisis management is not a prioritised 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 on the same time, there was no time buffer to engage and co-ordinate 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 from being implemented.

5.3 Constraints of disaster loss data management system

Table 11. Constraints of disaster loss management

1	**Legal (the EU and national)**
1.1	**No legal requirement exists for disaster loss calculation or crisis data access/collection.**

	Thus, there are very limited instances of attempts to quantify the disaster loss.
2	**Organisational and governance**
2.1	**The transition of the co-ordination of crises and emergencies to the GO needs some more time to settle in completely.** As the responsibilities for the co-ordination of crises and emergencies not related to national defense were transferred from the Ministry of Internal Affairs to the 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 the disaster loss data quantifications**. Different views whether it should be the responsible authority that 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 the regional crisis committees.** Regional crisis committees could take wider role both in risk assessments co-ordination 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 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 for getting access to relevant data.** If it is unclear whether 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 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 know-how of available data resources, etc.
4.2	**Updating national databases has delays, therefore the data is only partially relevant or usable in crisis situations**. Thus, 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 COVID-19 restrictions), more recent (near real time) data is needed.
4.3	**Authorities have limited access to the 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 is too long ago for the adequate comparison. It is unclear what kind of data is needed for the assessment, does the data exist 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 and 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.

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7 Appendices

Appendix 1 Key meetings of the Project Organisation

Table 12. List of interviews and meetings

Organisatsioon	Intervjuu kuupäev	Intervjueeritud isikud
Majandus- ja Kommunikatsiooni-ministeerium	06.01.2022	Kristi Talving (ettevõtlus- ja tarbimiskeskkonna asekantsler)
Sotsiaalministeerium	14.01.2022	Hede Sinisaar (analüüsi ja statistika osakonna juht)
Rahandusministeerium	21.01.2022	Ilona Reiljan (Juhtimissüsteemide nõunik) Martin Kulp (Õigusnõunik) Kaur Kaasik-Aaslav (nõunik Harju talituse juhataja ülesannetes)
Siseministeerium	24.01.2021	Eed Allik-Hõimoja (Sisekaitse ja kriisivalmiduse osakonna nõunik)
Hiiumaa	24.01.2022	Hergo Tasuja (Vallavanem)
Keskkonnaamet	25.01.2022	Agne Aruväli (Keskkonnaministeeriumi veeosakonna peaspetsialist) Raul Kurrista (nõunik) Teet Koitjärv (nõunik)
Pärnu	25.01.2022	Romek Kosenkranius (Linnapea)
Politsei- ja piirivalveamet	26.01.2022	Annika Orav (Politsei- ja piirivalve juhtivkorrakaitseametnik)
Tartu	26.01.2022	Evelin Uibokand (kriisireguleerimise koordinaator) Urmas Klaas (linnapea) Raimond Tamm (abilinnapea)
Terviseamet	27.01.2023	Andras Banyasz (peaspetsialist) Kristian Sirp (Kriisireguleerimise nõunik)
Majandus- ja Kommunikatsiooni-ministeerium	28.01.2022	Kristel Siiman ((Kriisireguleerimise nõunik) Jako Reinaste (Riigi varustuskindluse nõunik)
Päästeamet	31.01.2022	Tuuli Räim (Hädaolukorraks valmisoleku osakonna juhataja) Terje Lillo (Hädaolukorraks valmisoleku osakonna nõunik)
Tallinna linn	02.02.2021	Janek Lass (MUPO ameti juhataja asetäitja) Tauno Mettis (peaspetsialist) Margo Irve (juhtivspetsialist) Risto Aasmaa (peaspetsialist)
Riigikantselei	02.02.2022	Lauri Luht (SITKE juht)
Loksa	03.02.2022	Andres Kaskla (abilinnapea) Raik Saart (kriisikomisjoni liige)

Organisatsioon	Intervjuu kuupäev	Intervjueeritud isikud
Narva linn	03.02.2022	Urmas Tokman (kriisireguleerija)
Transpordiamet	04.02.2022	Mihkel Mäeker (riskijuht)
Alutaguse	07.02.2022	Tauno Võhmar (linnapea)
Sotsiaalkindlustusamet	08.02.2022	Raivo Sults (Kvaliteediosakonna juht) Signe Uustal (Finantsosakonna talitusejuhataja)
Eesti Linnade Valdade Liit	10.02.2022	Jan Trei (Asedirektor)
Setomaa	10.02.2021	Raul Kurde (vallavanem)
Haridus- ja Teadusministeerium	14.02.2022	Jaako Lindmäe (haldusvaldkonna juht) Mait Kask (haldusosakonna juhataja) Pärt-Eo Rannap (asekantsler)
Sisekaitseakadeemia	15.02.2022	Gert Teder (nõunik) Jaan Tross (lektor) Jaanis Otsla (direktori asetäitja)

Appendix 2 Local municipality services (in Estonian)

Table 13. Municipality services

Haridus	Huvitegevus ja sport	Kultuur
1. alusharidus ja lastehoid; **2. põhiharidus;** **3. gümnaasiumiharidus;** **4. hariduslikud tugiteenused, sh sotsiaalpedagoogi, eripedagoogi, logopeedi, psühholoogi teenus õpilastele;** 5. õpilaskodude ülalpidamine; **6. koolilõuna pakkumine;** **7. koolitransport;** **8. kutseharidus** 9. koolikohustuse täitmise järelevalve (laiemalt kvaliteetse hariduse tagamine).	13. huvitegevus, sh huvikoolide (muusika, kunst, tehnika)/, huvimajade ja noortekeskuste pidamine; 14. huviringide ja spordiklubide toetused lastele; 15. sporditegevus, sh spordirajatiste (väljakud) ja hoonete ülalpidamine.	16. raamatukogude tegevuse korraldamine/ IT punktid; 14. kultuurimajade/rahvamajade, muuseumide tegevuse korraldamine; 15. kultuuri- ja vabaaja ürituste toetamine; 16. kultuuriseltside toetamine; 17. piirkondlike muuseumide tegevuse korraldamine.

Majandus	Kommunaalmajandus	Keskkonnakaitse
18. **Teede ja tänavate korrashoid ja ehitus;** 19. Liikluskorraldus;; 20. üldplaneeringu kehtestamine; 21. detailplaneeringute kehtestamine; 22. arengu kavandamine;	33. tänavavalgustuse paigaldamine; 34. munitsipaal-elamispindade haldamine; 35. elamumajanduse korraldamine (nt tühjade korteritega tegelemine);	38. **korraldatud jäätmevedu;** 39. jäätmete liigiti kogumise korraldamine: 40. avalike prügimahutite tagamine; 41. heakord, haljastus, parkide korrastamine, kalmistute tegevuse korraldamine:

23. ehitamisega seotud lubade väljastamine;
24. maakorralduse toimingud;
25. aadressiandmete väljastamine;
26. maamaksu arvestamine;
27. turismi taristu rajamine ja kohalik mainekujundus;
28. **kaugkütte piirkondades soojavarustuse kättesaadavuse tagamine ja arendamine;**
29. **ühistranspordi korraldus (valla- ja linnasisesed liinid), maapiirkondades ühistranspordikeskustes osalemine, sh nõudetransport;**
30. KOVile kuuluvate sadamate haldamine
31. saarevahi teenus püsiasustusega väikesaartel
32. ettevõtluskeskkonna edendamine.
36. **ühisveevärgi- ja kanalisatsiooni teenuste kättesaadavuse tagamine ja arendamine;**
37. **sademevee ärajuhtimise korraldamine.**
42. vaba aja veetmise kohtade rajamine, avalike randade korrashoid;
43. müra ja õhusaaste vähendamine;
44. hulkuvate loomadega tegelemine.

Tervishoid	Sotsiaalhoolekanne	Muu
45. terviseedendus (liikluse, tule, narko, alko, ebatervisliku toitumise jne kahjude ennetamine); 46. **esmatasandi tervisekeskuste ruumide haldamineV.**	47. sotsiaalnõustamine; 48. abivajaduse hindamine ja abimeetmete määramine; 49. **KOV sotsiaaltoetuste määramine ja maksmine;** 50. **toimetulekutoetuse määramine ja maksmine;** 51. **lastekaitse;** 52. koduteenus; 53. turvakoduteenus; 54. väljaspool kodu osutatav üldhooldusteenus; 55. **tugiisikuteenus;** 56. täisealise isiku hooldus; 57. isikliku abistaja teenus; 58. **varjupaigateenus;** 59. sotsiaaltransporditeenus; 60. eluruumi tagamise teenus; 61. **vältimatu sotsiaalabi teenus;** 62. võlanõustamise teenus; 63. **lastehoiuteenus;** 64. asendushooldusteenus; 65. järelhooldusteenus; 66. KOV omandis olevate sotsiaalhoolekandeasutuste ülalpidamine.	67. **elukoha registreerimine rahvastikuregistris;** 68. **sündide ja surmade registreerimine;** 69. perekonnaseisu toimingud (maakonnakeskuse KOVid) 70. tugiteenused (finants, personal, õigus, dokumendihaldus); 71. KOVide omavaheline koostöö, väliskoostöö; 72. koostöö kodanikuühiskonnaga.

Appendix 3 Risk lists that affect local municipalities (in Estonian)

Table 14. List of risks

#	Riskisündmus
1	üleujutus
2	maalihked
3	metsatulekahju
4	äärmuslik ilmastik (külm, kuum, põud, udu, paduvihm)
5	torm, tuul 21< m/s
6	lennuõnnetus
7	laevaõnnetus
8	rongiõnnetus
9	liiklusõnnetus
10	merereostus
11	keskkonnareostus
12	epideemia
13	mürgistus
14	loomataud
15	tulekahju hoones
16	hoone varing
17	plahvatus
18	õnnetus ohtlike ainetega, sh kiirgusõnnetus
19	tuumaõnnetus välisriigis
20	küberrünnak
21	andmesideteenuse katkestus
22	mobiil- ja telefoniside katkestus
23	vee- või kanalisatsioonikatkestus
24	kaugkütte katkestus
25	makseteenuse katkestus
26	sularahateenuse häired
27	elektrikatkestus
28	maagaasikatkestus
29	vedelkütusekatkestus
30	teede sõidetavuse katkemine
31	eID ja digiallkirja teenuste katkemine
32	toidu-, ravimite- ja esmatarbekaupade kättesaadavuse katkemine
33	tervishoiu vältimatu abi kättesaadavuse katkemine
34	hübriidrünnak
35	oht põhiseaduslikule korrale

36	oht riigi julgeolekule
37	äkkrünnak, sh pantvangi võtmine
38	CBRN rünnak
39	massiline korratus
40	välismaalaste massiline sisseränne
41	terrorism
42	sõjaoht
43	kliimamuutustega seonduvad probleemid
44	Vaimse tervisega seonduvad probleemid
45	Elanike toimetuleku risk (nt energiahinna tõus, hinnatõus)
46	Meedias/sotsiaalmeedias leviv valeinfo
47	Rannikureostus
48	Delikaatsete isikuandmete leke
49	Protestid, mis laienevad üle planeeritud aja ja koha

Appendix 4 Glossary (Estonian)

Table 15. Glossary in Estonian

Term	Definition
Oht	Inimtegevusest, loodusnähtusest, tehnoloogiast, tehnikast või muust asjaolust tingitud sündmus, sealhulgas hädaolukord või kriitilise tegevuse toimimiseks vajaliku ressursi puudumine, mis võib põhjustada elutähtsa teenuse toimimi-seks vajaliku kriitilise tegevuse katkestuse või häire
Risk	on võimalik oht või sündmus, tegevus või tegevusetus, mis võib ohustada eesmärkide saavutamist
Riskihinnang	on üldine protsess selleks, et anda hinnang riski suuruse kohta ja teha otsus, kas risk on talutav või mitte.
Riskijuhtimine	on süstemaatiline riskide hindamine eesmärkide tagamiseks ja negatiivsete tagajärgede minimeerimiseks
Kriis	Sündmus või sündmuste jada, mis ohustab igapäevaseid tegevusi ja norme. Kriisi olulisus on subjektiivne.
Kriisiplaan	Kirjalik dokument, mis paneb paika rollid, vastutused, kommunikatsiooni-kanalid ja juhised kriisisündmusele vastamiseks
Toimepidevus	teenuseosutaja järjepideva toimimise suutlikkus ja järjepideva toimimise taas-tamise võime pärast elutähtsa teenuse katkestust
Ristsõltuvus	erinevate teenuste omavaheline oluline mõju üksteise toimimisele
Korraldav asutus	ühe või mitme elutähtsa teenuse toimepidevuse eest vastutav ministeerium, kohaliku omavalitsuse üksus või Eesti Pank
Hädaolukord	Sündmus või sündmuste ahel või elutähtsa teenuse katkestus, mis ohustab paljude inimeste elu või tervist, põhjustab suure varalise kahju, suure keskkonnakahju või tõsiseid ja ulatuslikke häireid elutähtsa teenuse toimepidevuses ning mille lahendamiseks on vajalik mitme asutuse või nende kaasatud isikute kiire kooskõlastatud tegevus, rakendada

	tavapärasest erinevat juhtimiskorraldust ning kaasata tavapärasest oluliselt rohkem isikuid ja vahendeid.
Elutähtis teenus	Teenus, millel on ülekaalukas mõju ühiskonna toimimisele ja mille katkemine ohustab vahetult inimeste elu või tervist või teise elutähtsa teenuse või üldhuviteenuse toimimist. Elutähtsat teenust käsitatakse tervikuna koos selle toimimiseks vältimatult vajaliku ehitise, seadme, personali, varu ja muu sellisega.
Elutähtsa teenuse toimepidevus	elutähtsa teenuse osutaja järjepideva toimimise suutlikkus ja järjepideva toimimise taastamise võime pärast elutähtsa teenuse katkestust.
Hädaolukorra oht	olukord, kus ilmnenud asjaoludele antava objektiivse hinnangu põhjal võib pidada tõenäoliseks, et sündmus või sündmuste ahel või elutähtsa teenuse häire võib lähitulevikus laieneda hädaolukorraks.
Kadu (loss)	Õnnetusest/kriisist tingitud mitte-otsene kahju. (näiteks ajutiselt majandusttegevusele tekkinud kahju)
Kahju (damage)	Õnnetusest/kriisist tingitud füüsiline (materjaalne) kahju.
Inimestele avalduvad kahjud	surmad, vigastused, kriisi tulemusel kolima sunnitud inimesed
Füüsilised kahjud	kahjustused ehitistele, infrastruktuurile, põllumajandusele, looduskeskkonnale. Üldjuhul arvutakse füüsilised kahjud ümber rahalisteks kuludeks.
Majanduslikud kahjud	teenuste häired, mis jaotuvad üldjuhul kolme kategooriasse – otsesed, kaudsed ja makromajanduslikud (nt SKP vähenemine)

Appendix 5 RB assessed criteria in local municipalities crisis preparedness ratings

RB local municipality crisis preparedness rating is based on the results of the following assessed areas:

- Complying with regulations regarding crisis management:
  - Crisis committee of the local municipality is functional
  - Crisis committee work is planned
  - Requirements for ensuring the continuity of vital services are established
  - Risk assessment for the provider of vital service has been confirmed
  - Continuity plan for the provider of vital service has been confirmed
  - A HOLP has been compiled and approved
  - The provider of a vital service has conducted an exercise of continuity of service that has been monitored.
- Assurance of crisis management during a crisis:
  - Person that handles crisis management has been appointed
  - Structure for crisis management has been created
  - Crisis management exercises have been done
  - Providers of important services have been mapped
  - The resource requirements to ensure the continuity of vital services are known.
- Local municipality's aid to residents during crisis:
  - Evacuation places have been mapped
  - In case of emergency, help is provided to population at risk

    - The local municipality includes volunteers in aiding population at risk
    - The local municipality has the capability to provide widespread and essential social aid during crisis.
- Organising the communication of risks by the local municipality:
    - Information about increasing preparedness for crises is available on the local municipality's website
    - Information is shared elsewhere (other than on the website)
    - Community and partners are included in the effort of informing residents.
- Increasing the capability of solving crisis and recovery:
    - Crisis management room is continuously operative with the necessary equipment
    - The local municipality has trained officials who solve crises
    - Psychological help for the victims is offered
    - The local municipality has analysed the last crisis or exercise.

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