

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

REFORM/SC2021/076 (21EE02)

Deliverable 2.3: Evaluation of alternative to-be scenarios and recommendation report for risk mapping and disaster loss data management

Draft version, 18.10.2022

The project is funded by the European Union via the Structural Reform Support Programme and implemented by PwC, in cooperation with the European Commission

pwc

Republic of Estonia
Government Office

EC DISCLAIMER

© European Union, 2022

Reuse of this report is authorised provided the source is acknowledged and that you do not distort the original meaning or message of the document. The Commission does not assume liability stemming from the reuse. The Commission's reuse policy is implemented by Commission Decision 2011/833/EU of 12 December 2011 on the reuse of Commission documents.

The views set out in this report are solely those of the authors and do not represent the official views of the European Commission.

PricewaterhouseCoopers disclaimer

This report has been prepared by PricewaterhouseCoopers EU Services EESV based on the instructions provided by the client. We do not, in giving this opinion, accept or assume responsibility for any other purpose or to any other person to whom this report is shown or into whose hands it may come unless where expressly agreed by our prior consent in writing.

Should any other person obtain access to and read this report, by reading this report such person accepts and agrees to the following terms:

1. The reader of this report understands that the work carried out by PricewaterhouseCoopers EU Services EESV was performed in accordance with instructions provided by our addressee client and was performed exclusively for our addressee client's and its related parties', directly involved in the planned restructuring, benefit and use.

2. The reader of this report acknowledges that this report was prepared at the direction of our addressee client and may not include all procedures deemed necessary for the purposes of the reader.

3. The reader agrees that PricewaterhouseCoopers EU Services EESV, its partners, employees and agents neither owe nor accept any duty or responsibility to it, whether in contract or in tort (including without limitation, negligence and breach of statutory duty), and shall not be liable in respect of any loss, damage or expense of whatsoever nature which is caused by any use the reader may choose to make of this report, or which is otherwise consequent upon the gaining of access to the report by the reader. Further, the reader agrees that this report is not to be referred to or quoted, in whole or in part, in any prospectus, registration statement, offering circular, public filing, loan, other agreement or document and not to distribute the report without PricewaterhouseCoopers EU Services EESV prior written consent.

Glossary

Term	Definition
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.[1]
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.[2]
Compound risk	When multiple risks occur simultaneously, or one after another.[3] 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.[4]
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.[5]
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.[6]
Crisis management	A system of measures which includes preventing, preparing for, and resolving an emergency.[7]
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.[8]
Disaster loss accounting	Assessment of disaster loss for crisis that have taken place (backward looking). The primary motivation for recording disaster loss with the

[1] Riigi Teataja, ”Emergency Act,“ published June 13, 2017, https://www.riigiteataja.ee/en/eli/513062017001/consolide
[2] Riigi Teataja, ”Emergency Act,“ published June 13, 2017, https://www.riigiteataja.ee/en/eli/513062017001/consolide
[3] Dale Willman, “Double Trouble: The Importance of Thinking About Compound Risk,“ Columbia Climate School, published August 11, 2017, https://news.climate.columbia.edu/2020/08/11/compound-risk-hurricanes-wildfires/#:~:text=Compound%20risk%20%E2%80%94%20when%20multiple%20risks,at%20Columbia%20University's%20Earth%20Institute.
[4] Jakob Zscheischler, Olivia Martius, Seth Westra. et al., “A typology of compound weather and climate events,” Nat Rev Earth Environ, no. 1 (2020): 333-347, https://www.nature.com/articles/s43017-020-0060-z
[5] Riigi Teataja, “Emergency Act,“ published June 13, 2017, https://www.riigiteataja.ee/en/eli/513062017001/consolide
[6] The International Organisation for Standardisation “ISO/DIS 22300 Security and resilience – Terminology”
[7] Riigi Teataja, ”Emergency Act,“ published June 13, 2017, https://www.riigiteataja.ee/en/eli/513062017001/consolide
[8] Piero Conforti, Mira Markova, Dimitar Tochkov, “FAO’s methodology for damage and loss assessment in agriculture,” Food and Agriculture Organization of the United Nations, published 2020, https://www.fao.org/documents/card/en/c/ca6990en/.

Term	Definition
	aim to document the trends and aggregate statistics informing local, national and international disaster risk reduction programmes.[9]
Disaster loss methodology	Disaster loss methodology aggregates the losses suffered as a result of a disaster event. Most commonly, disaster loss is calculated for human, physical and economic losses. Disaster loss can be accounted for, after the event takes place, but also potential loss can be estimated based on a risk scenario. Once this is used in disaster risk management it allows to analyse avoided losses.
Disaster 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. [10]
Disaster risk modelling	Assessment of disaster loss for potential crisis (forward looking). It aims to improve risk assessments and forecast methods. Loss data is used to infer vulnerabilities and to identify sectoral areas for disaster risk reduction and mitigation measures.[11]
Interdependency of services	Dependency of service providers on other services, resources etc. Disruptions in one service may lead to disruptions in others.
Loss	Quantifiable measures expressed in either monetary terms (e.g., market value, replacement value) for physical assets or counts such as number of fatalities and injuries.[12]
Risk	An effect of uncertainty on objectives. Risk is usually expressed in terms of risk sources, potential events, their consequences, and their likelihood.[13]
Risk management	Coordinated activities to direct and control an organisation with regard to risk.[13]
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.[14]

Abbreviations

Term	Definition

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

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

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

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

[13] The International Organisation for Standardisation "ISO31000:2018 - RISK MANAGEMENT"

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

AI	Artificial intelligence
BA	Bank of Estonia
CM	Crisis management
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
EWS	Early warning systems
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
IoT	Internet of Things
KCDC	The Infectious Disease Control and Prevention Act (Korea)
KOKS	The Local Government Organisation Act (Kohaliku omavalitsuse korralduse seadus)
LB	The Land Board
LM	Local Municipality
MoC	Ministry of Culture
MoE	Ministry of Environment
MoEC	Ministry of Economic Affairs and Communications
MoF	Ministry of Finance
MoS	Ministry of Social Affairs
NDRCC	the National Disaster Reduction Centre of China
NNDIMS	The National Natural Disaster Management System (China)
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
SITKE	The Situation Centre of the Estonian Government Office
SITIKAS	The IT system used at SITKE
UAV	Unmanned air vehicles
VFB	The Veterinary and Food Board
VOS	The Preparedness Law (Valmisolekuseadus)

Executive summary

Purpose of the report

The purpose of this report is to set out in more detail the functionalities and requirements for the local municipalities' crisis management toolbox and disaster loss methodology.

The requirements for the system were defined in cooperation with the stakeholders – local municipalities, responsible agencies, and relevant ministries. The requirements concern the functionality of the risk management toolbox and areas a municipality should consider improving their risk awareness. Additionally, this report sets out specific needs for the content of the modules in the toolbox.

This report also includes an analysis for various implementation decisions. The implementation scenarios cover both areas – the local municipalities' risk and crisis management toolbox, which is the main focus of this deliverable, and the disaster loss methodology.

Scope of the report

This report has been developed within the Project carried out by PricewaterhouseCoopers EU Services EESV (hereinafter – PwC) on behalf of the DG REFORM, according to the specific contract No. REFORM/SC2021/076 (21EE02), signed on October 14, 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.** Separate report is issued for Outcome 1 and all combined reports make up the complete package of deliverables.

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

Key findings and recommendations

the key findings and recommendations fall into 2 categories and involve the recommendations made to establish the crisis management system for local municipalities and develop a national disaster loss methodology.

The key recommendations for the municipalities risk management methodology are the following:

- **Users** –local municipalities in short term (and regional crisis committees in longer term)
- **Obligatoriness of risk assessment** – risk assessment should be mandatory for local municipalities.
- **Obligatoriness of methodologies**– methodology selection should be flexible according to the needs of the municipalities.
- **Frequency of assessments** – risk assessment should be done ad hoc but at least once in 2 years, but capabilities should be assessed annually as a part of annual budgetary planning.
- **Funding of the municipalities risk management activities** – municipalities should receive additional resources for risk management activities, but if the obligations are not sufficiently met, the funds could be recalled.
- **Owner of the municipalities risk management methodology** – Rescue Board.
- **Technical hosting of the methodology** – Rescue Board's crisis exercise environment.
- **Communication principles**– risk and vulnerability assessment results need to be communicated between responsible agencies and municipalities well as regionally, among neighbouring municipalities.

- **Access rights** – should be determined on a case-by-case basis – the main part of results should be published, but sensitive areas can be restricted.
- **Communication channels**: the risk assessment results should be made available via the methodology technological platform to all the relevant stakeholders.

The key recommendations for the national disaster loss methodology are the following:

- **Goals and purpose of the disaster loss assessment** – the disaster loss methodology should allow agencies and ministries to account for the impact of past risk events. In addition, it should support disaster modelling and not only to give an overview of potential impact of the crisis, but also provide necessary input to prioritise precautionary measures and investments.
- **Users** – every responsible agency or ministry that finds it useful for their own risk assessment could use the methodology, but the main target user is the GO (and stakeholders who are involved by the GO) who is responsible for calculating the society-wide disaster loss.
- **Obligatoriness** – mandatory part of the national risk assessment.
- **Approach** – co-creation by GO, responsible agencies, ministries, and other relevant stakeholders.
- **Frequency of assessments** – in conjunction with the national risk assessment.
- **Owner of the methodology** – Government Office
- **Technical hosting of the methodology –** The scope of this project is to create a disaster loss methodology. This methodology does not need a separate technical platform for hosting. It can be hosted wherever suitable for the stakeholders, for example in the local municipalities' toolbox. In the long term, a disaster loss accounting or modelling process and storage of input/output data could benefit from a technical platform. However, choosing a suitable platform needs further analysis beyond the current project scope.

Lühikokkuvõte

Aruande eesmärgid

Käesoleva aruande eesmärk on panna täpsemas detailsuses paika kohalike omavalitsuste kriisijuhtimise ja kriisikahjude hindamise süsteemi tööriistade funktsioonid, nõuded ja vajadused.

Aruanne annab ka ülevaate nõuetest, mida turuosalised seavad uutele Eesti kriisijuhtimise tööriistadele, sh vajadused seoses KOV kriisijuhtimise tööriista ja kriisikahjude hindamise metoodikaga. Aruanne toob välja funktsionaalsuse ja teemad, mida metoodika peaks katma, et toetada KOV-e ülesannete täitmisel. Lisaks toob aruanne välja erinevad stsenaariumid loodava metoodika rakendamise kohta.

Aruande ulatus

Aruanne on koostatud Euroopa Komisjoni struktuurireformide toe peadirektoraadi (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.

Tähelepanekud ja soovitused

Selle aruande peamised tähelepanekud ja soovitused jagunevad kahte kategooriasse ja tuhinevad KOV-ide kriisijuhtimis see “tööriistakasti” ja riikliku kriisikahjude metoodika rakendamisele

KOV kriisijuhtimise tööriistakasti rakenduslikud soovitused on järgmised:

- **Kasutajad** – lühemas perspektiivis KOV-id, pikemas perspektiivis ka regionaalsed kriisikomisjonid.
- **Riskide hindamise kohustuslikkus** – riskide hindamine peaks olema KOV-idele kohustuslik.
- **Metoodika rakendamise kohustuslikkus** – KOV-idel peaks olema paindlikkus valida endale sobiv riskide hindamise metoodika.
- **Sagedus** – riske tuleks KOV-idel hinnata vajaduspõhiselt, aga vähemalt kord kaheaasta jooksul, võimekusi aga iga-aastaselt osana eelarveplaneerimisest.
- **Rahastus** – KOV tuleks eraldada sihtotstarbeliselt lisarahastus kriisijuhtumise tegevuste elluviimiseks.
- **Metoodika omanik** – Päästeamet.
- **Metoodika ja andmete tehniline hoiustamine**: Päästeameti õppuste keskkond.
- **Kommunikatsiooni põhimõtted** – riskide ja haavatavuste hinnangud peaksid olema jagatud vastutavatest asutustest KOV-idele, KOV-idest asutustele ja regionaalsete kriisikomisjonide vahendusel ka regionaalselt KOV-ide vahel.
- **Ligipääsupiirangud** – tuleks määrata kaasuspõhiselt, üldreeglina oleks tulemused avalikud, kuid tundlike valdkondade tulemeid saaks piirata.
- **kommunikatsioonikanalid** – riskihinnangute tulemid peaksid olema läbi tehnilise platvormi kättesaadavad kõigile relevantsetele osapooltele.

Riikliku kriisikahjude hindamise metoodika rakendamise soovitused

- **Eesmärk** – kriisikahjude hindamise metoodika peaks võimaldada erinevatel osapooltel hinnata toimunud kriiside kulusid ja kahjusid, aga ka prognoosida tulevaste võimalike kriiside tagajärgi. Kriisikahjude prognoosid võiksid aga mitte ainult anda ülevaadet kriisi mõjust, vaid olla oluliseks sisendiks riigi riskistsenaariumite prioriseerimisel ja efektiivsete kriisihalduse meetmete ja investeeringute valikutes.
- **Kasutajad** – Metoodika kasutajad võivad olla kõik asutused, kes seda endale kasulikuks peavad, kuid põhikasutaja peaks olema Riigikantselei, kes võib erinevaid komponente kahjude hindamisest delegeerida osapooltele ministeeriumites või asutustes.
- **Kohustuslikkus** – kahjude hindamine peaks olema kohustuslik osa riikliku riskiraporti koostamisest.
- **Lähenemisviis** – Riigikantselei koordineerimisel korraldatud ekspert-töörühmad.
- **Sagedus**–riigiriskiraporti koostamise käigus.
- **Metoodika omanik** – Riigikantselei.
- **Metoodika ja andmete tehniline hoiustamine** – käesolevaprojekti käigus loodava kriisikahjude hindamise metoodika hoiustamiseks ei ole vaja luua eraldi tehnilist süsteemi. Metoodikat saab hoiustada ükskõik millises osapooltele sobivas keskkonnas, nt KOV-ide riskide hindamise tööriisakastis. Kriisikahjude hindamise protsessi juhtimiseks ning sisendite/tulemite hoiustamiseks oleks kasulik luua eraldi tööriist**.** Tööriistale sobiva keskkonna loomine vajab käesolevast projektist väljaspool täiendavat eraldiseisvat analüüsi.

Table of Contents

1 Introduction 12

1.1 Scope of the report 12

1.2 Methodology and Approach 12

1.3 Limitations 13

2 Gap analysis 14

2.1 Background for the gap analysis 14

Gap analysis between the current and to-be situation 15

3 To-be scenarios 21

3.1 Context and methodology of the development of to-be scenarios 21

3.2 Implementation scenarios for the local municipalities' risk management methodology (in Estonian) 22

3.3 Stakeholder impacts of local municipalities' risk and crisis management toolbox 39

3.4 Critical uncertainties concerning the implementation of local municipalities' risk and crisis management toolbox 41

3.5 Implementation scenarios for the disaster loss methodology (in Estonian) 43

3.6 Stakeholder impacts on disaster loss methodology 56

3.7 Critical uncertainties concerning the disaster loss methodology 58

4 Description of emergent technologies 59

4.1 Big data developments 59

4.2 Social media usage in disaster management 61

4.3 Internet of Things (IoT) usage in emerging technologies 63

4.4 Other crisis management tools and technologies 65

5 Recommendations 67

5.1 Recommendations 67

5.2 Recommendations for the local municipalities risk management toolbox 67

5.3 Recommendations for the national disaster loss methodology system 70

6 Appendices 74

1 Introduction

1.1 Scope of the report

1.1.1 Purpose and Outcome

The report has been drafted for Outcomes 2 (and 3). Outcome 1 disclosed is in a separate report. This report will give a more thorough overview of the gaps which need to be addressed, as well as different possible to-be scenarios and recommendations to the Beneficiary.

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

1.1.2 Scope of the Project Outcomes 2 & 3

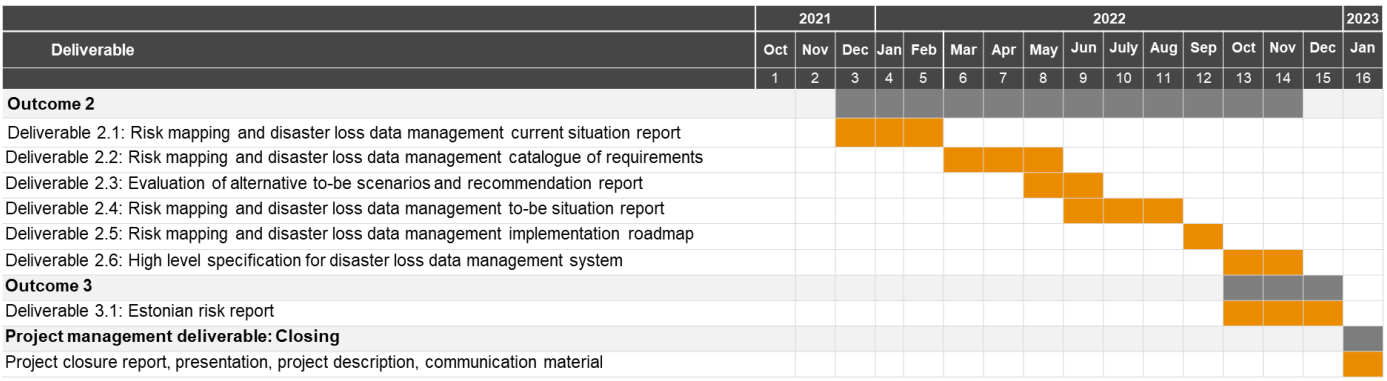
The scope of the project outcomes 2 & 3 has two focuses: the first focus is on **local municipalities' crisis management activities.** This involves activities in 3 stages: preparing for the crisis (creating risk awareness, assessing risks, designing prevention and resilience policies), activities during crisis, and activities after a crisis. The second focus is on the **state authorities level disaster loss data management** and aims to design the methodology behind the calculations.

1.2 Methodology and Approach

In order to create and evaluate the alternative to-be scenarios, some activities were already done during deliverable 2.2, such as conducting a less-detailed gap analysis. During this deliverable, additional interviews and co-creation workshops with the main stakeholders and the Beneficiary were held. The co-creation and review sessions with the Beneficiary took place weekly on Fridays. These sessions included exchanging and validating the information obtained to date.

Figure 1 gives a high-level overview of the project activities and timeline. The activities of current situation mapping took place from May 2022 to June 2022.

Figure 1. Project Activities and Timeline



Three different methods were used and combined to evaluate the alternative to-be scenarios (see Figure 2).

Figure 2. Methods used to evaluate the alternative to-be scenarios



The methods used to evaluate the different possible to-be scenarios included analysis based on the current gaps of the crisis management system, and assessment of different foreign practices. This was followed by co-creation and validation workshops with the main stakeholders of the project, after which a scenario validation was conducted with the Beneficiary.

1.3 Limitations

The main limitations come from the current geopolitical situation in Ukraine – the situation also has made it difficult to engage all relevant stakeholders in co-creation workshops in Estonia to validate the to-be scenarios due to the limited availability of all the participants.

2 Gap analysis

2.1 Background for the gap analysis

Crisis management:

The main problem we are trying to solve concerns the gaps in the local municipalities' (LM) risk awareness, their knowhow and ability to carry out risk identification and assessments, and application of the awareness and knowhow gained from the risk assessment to prevent or prepare for potential risk events applicable for them. Currently, there is no systematic practice of LMs carrying out risk assessments. Only few LMs take the proactive approach and analyse their risk environment and prioritise their risk scenarios to prepare for, but they lack common methodology and approaches which would support and guide them in preventing, preparing, and responding to risks and crises.

Some LMs (usually larger ones) put much effort into creating risk awareness and increasing their resilience. Ability to carry out these activities is dependent on the legal requirements for the municipality, the resources available for the municipality to either invest into preparedness or hire a person(s) whose primary task is related to crisis management, or just the background of the LM's leadership – if the head of the municipality has been a member of Estonian Defence League or the RB, they are more likely to understand the importance of crisis management and dedicate resources accordingly. Other LMs, who are less active in crisis management argue that they lack resources and knowhow. Moreover, if the municipality is small and crises rarely happen it is difficult for them to dedicate resources for dealing with potential crises which may not ever happen, instead of other mundane matters where the political demand is larger.

The lack of systematic crisis management starting from risk awareness is the primary gap this project is aiming to solve. For this reason, the focus of the project is on establishing a common methodology and toolbox available for all municipalities. By having this common methodology, it becomes easier for LMs to understand their risk environment, increase their risk awareness, and improve their preparedness.

Disaster loss:

When it comes to disaster loss management, as mentioned already in previous reports, Estonia does not have a systematic approach to evaluate disaster loss. An exemption is flood risk management where the Ministry of Environment has established a methodology, but data usage is still fairly limited. Therefore, there is one underlying major gap – the non-existence of the disaster loss management system, shared methodology, competencies, and tools.

Disaster loss methodology helps to quantify losses caused by the disaster and investments needed for recovery. This gives an indication for the need of reserves for disaster recovery. Additionally, disaster loss modelling can help to quantify potential costs of future crises and consequently build motivation for investments into preparation and prevention. Additionally, if disaster loss modelling also accounts for vulnerabilities and preparedness measures, it can also support justifying investments into prevention or capacity building by quantifying the cost and benefits of the measures.

This project contributes to reducing the gap in disaster loss management by developing a systematic and common approach/methodology for disaster loss management. This methodology will be available for all levels of crisis management in Estonia. LM's may use the methodology if they want to enhance their risk management and crisis preparations processes. Responsible agencies can use this methodology in their risk analysis and the government office (GO) may promote the usage of the methodology by incorporating the results into the national risk assessment.

Gap analysis between the current and to-be situation

Crisis management:

Currently, there is no common systematic approach to risk and crisis management in LMs. There are numerous constraints that have hindered the establishment of a unified risk and crisis management system in LMs. We have mapped most of the constraints already in Deliverable 2.1 during the current situation mapping interviews. However, some additional constraints, necessary functionalities and requirements for the methodology and tools were collected and developed during international practice review and requirements development within Deliverable 2.2.

In the table below we will give an overview of how the methodology proposed would address the identified constraints/gaps. The proposed tool structure was presented in Deliverable 2.2 and the table below makes relevant references to the tool modules.

Detailed overview of the different detailed alternative methodological approaches considered and the arguments for final selection can be found in Appendix 2. As the main users of these thought processes are local stakeholders, the detailed arguments in the appendix are documented in Estonian.

Table 1. Gap-analysis based on initial constraints from the LM's current situation interviews (Deliverable 2.1)

No	Constraint	Potential gap-fill from the tool
1	**Legal**	
1.1	**The current regulation on municipality role in the crisis preparedness is not precise enough.** It should specifically require the crisis preparedness of LMs and list the corresponding requirements in more detail.	**Module: Role expectations.** The tool will establish a role expectation for LMs. To establish the role expectation of the LMs, we will review the anticipated new legal acts' responsibilities of LMs in a context of crisis management. In consultations with the responsible authorities, we will define the role expectation in different stages of crisis management in different types of crises. As a result, the tool offers a clear overview of LM's role and responsibilities regarding crisis management.
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. No mandatory requirements can be placed on the municipalities without changes in the legal environment.	**The use of the tool itself shall not be mandatory.** Currently, the new civil preparedness and national security law (VOS), which will assign further crisis tasks to municipalities is still in the process of being developed. VOS, however, does not require LMs to carry out risk assessment, but mentions it as a potential way to develop their annual plan. Our methodology helps to guide the municipalities through the process. Even if the usage of the tool remains voluntary it could be strongly supported and driven by the RB representatives within the local crises' committees.

2	Organisational and governance	
2.1	**Local municipalities are not sufficiently involved in crisis management planning.** Regarding national defence emergencies, they are not even informed of the expectations of them (national secret), however they have a significant role to play. For other emergency risk types managed at state authority level, LMs are not engaged in HOLP creation either but at least in most cases they are informed of the outcome through regional crises committees.	**Module: Role expectations.** See above for details.
2.2	**Lack of commitment by the local municipal council to crisis management.** Crisis management will always compete with day-to-day politics. Investing into visible benefits for the public is politically motivated, crisis management is not. Many municipal councils do not see value in investing in preparedness.	**Module: all Risk awareness modules.** With establishing the toolbox, we aid the municipalities in their risk and crisis management activities. This means that the benefits of the activity can become clearer for the municipalities. We believe that by increasing the awareness the municipalities will start to see the importance of risk management and crisis preparedness. This is why we also recommend that the assessment should be mandatory for all the municipalities.
2.3	**Unclear responsibilities of local municipalities in crisis management**. Numerous parties solve their aspects of the crisis; however, cooperation is limited, and HOLP-s are vague when it comes to municipality role. Unclear responsibility also leads to freeride effect and allows municipalities not to pay attention to crisis management.	**Module: Role expectations.** See above for details.
2.4	**Examples of not valuing the proactiveness of local municipalities on crisis management**. If municipalities take proactive initiative, these should be valued on the state level – overriding or ignoring activities and information from LMs demotivate future actions. Examples from Covid-19 crisis management: HB did not react to information from LMs regarding businesses that do not follow Covid-19 guidance and should be sanctioned or closed. The Ministry of Education overruled municipalities' decisions to close schools (even when HB recommended it). This means that next time the municipalities are more likely to wait for specific guidance rather than react themselves.	**Module: Role expectations.** See above for details.
2.5	**Speed of changes in staff of local municipalities affects risk assessment processes.** The changes in the LM can happen often, based on the election cycle, sometimes due to political instability even more often than once in 4 years. If the governing people change, they often start assessing crisis events all over again, and do not consider what has been made by the previous government (might even override the commitments made and change the budgetary allocation). In addition to priority setting, as prior risk planning activities are not documented in a structured way so the basis to continue the work in progress is weak. On the contrary, in some municipalities, the people in charge may remain the same for decades. Crisis events tend to get attention, if there has been a crisis, but if nothing has happened during the	**Module: Risk profile.** **Module: Scenario setting and prioritisation.** Creating documented risk and vulnerability analysis will allow easier transfer of knowhow. The knowledge coming from the risk assessment process will be documented in the tool and stay in the municipality even after changing its staff. Even in the case of elections and appointment of a new local government, the results of prior risk assessments could be used, and the work done by the previous government could be continued.

	decades in power, there is lack of motivation for increasing preparedness.	
2.6	**Size and the resources available matter**. The majority of local authorities are too small to effectively afford to pay attention to emergency preparedness. However, size or resource constraints should not be considered an excuse not to deal with risk management. If municipalities struggle on their own, they may be more likely to cooperate with others or merge further.	**Methodology geared to existing competence.** The tool will be usable and universal to all municipalities, regardless of their size and capabilities. It will take into account the current limited risk management competences in many LMs. The guidance documents, templates, examples etc. can be used in more simplistic ways in less advanced LMs and in more depth by more advanced LMs.
2.7	**Majority of the municipalities feel they lack sufficient funding and personnel with appropriate risk competences.** Although LMs know they need to manage all requirements with the funding available, they feel state level risk mitigation priority setting initiatives should come together with sufficient additional funding. For example, during Covid-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.	**The guidance materials created by PwC will support the capacity and competence building in the LMs, as well as provide them with the necessary templates for the different modules of the risk management tool.** This way, even municipality officials without specific crisis management training are able to carry out the risk assessment. Moreover, the methodology accounts for differences in capabilities of LMs.
2.8	**Simply putting together, a risk analysis on paper (or buying a ready-made risk assessment) does not help local authorities and make them think risk events through**. New approach must trigger internal analysis. Crisis management exercises are considered the most effective tool by many stakeholders.	**The methodology is not built up to simply fill in the risk assessment results template. Instead, it is more focused on the activities and information that facilitates the risk awareness creation.** The methodology will have significantly more risk content modules (e.g., LM profile, LM local services, risk collection, statistics on prior realised risk events etc.) than risk assessment output requirements. The tool is built up in the waterfall concept, guiding the user to complete awareness creating modules prior to accessing the output templates. The guidance materials will emphasise the need for group discussions (and engaging third parties where relevant) and the concept that the value of risk management does not come from the documentation and creation of specific risk assessments, rather from the thought process taking place within the municipality. Therefore, it would be fine for the municipality to involve additional support from the private sector to guide and support them during the process, but not completely outsource the assessment.
3	**Operational**	
3.1	**Duplicating communication.** When state institutions need information from LMs the questions are not coordinated – the same information is asked from various sources (from municipality government but also from its institutions) duplicating the work done. Duplication also happens when different state institutions give information to LMs. The messages may occasionally even contradict each other.	**Module: Description of methodologies and guidance.** The methodology will give guidance for communication. Firstly, the guidance documents will establish where the LM will get the information it requires to understand its conditions and potential risk. Additionally, it sets out guidance on how plans and assessments should be communicated between LMs, regionally as well as nationally.

3.2	**Smaller local municipalities hide behind the "but we do not have to do it" mentality**. In addition, the LMs are not keen to admit that there are things they should do but are unable to do.	**Module: Role expectations.** See above for details.
3.3	**Lack of feedback on the preparedness.** If no one gives the LMs continuous feedback on what they currently do, they get the impression that everything is in good shape.	**Module: Preparedness maturity assessment.** Preparedness assessment module will have easily fillable crises preparedness maturity assessment checklist covering various preparedness categories. The assessment should yield suggestions for the LM on which general areas and how to improve as a first priority. Results may be compared across LMs as well for further benchmarking and internal feedback.
3.4	**Risk analysis focus is on one risk (or location) at a time.** Interdependencies of different events and services (e.g., storm with blocked roads also in other neighbouring municipalities, loss of electricity and thus also heavily affected other services) are currently rarely considered. Municipality focus is within its own borders, there could be a need to keep in mind potential risk events from other municipalities and how it could influence the referent municipality.	**Module: Examples of cross-dependencies and domino effects.** The tool shall contain examples of different cross-dependencies between risks and services (including the vital services and LM's own services) to allow LMs to take these into account when building its risk profile and selecting most relevant risk scenarios.
3.5	**Resources available to solve the crisis may not be adequate for complex crisis.** State level and municipalities may rely on the same assets, meaning one of them does not have real access to the assets during the actual crisis. For example, road maintenance service providers can promise the use of their equipment to the National Transportation Authority and to LMs simultaneously and no-one has a clear overview of the total available equipment.	**Module: Critical resource mapping.** The tool shall give guidance and examples on how to map both critical material and personnel resources that may be needed for fast deployment in a crisis event.
3.6	**Resource allocation prioritization is often not considered in advance.** For example, municipalities say that they have bought (usually 1-3) generators. These generators are used to make sure water and sewage services are provided if there is a power outage. But they also can be used in social care facilities if needed or at evacuation sites. It is unclear what takes priority. Lack of priority use areas applies also to local RB resources if there is a crisis that impacts multiple areas simultaneously.	**Module: Local municipality profile.** **Module: Critical resource mapping.** The tool shall standardise the creation of a brief LM profile and list up the services which the LMs offer, including an assessment of service criticality from the risk/crisis perspective. Currently the priority for LMs' should be the vital services they are responsible for (the 33 largest municipalities); however, once VOS is approved it adds other services to the critical service list. In conjunction with critical resource mapping, this makes it easier to allocate resources to most critical services/locations.
4	**Technical**	
4.1	**Low usage of DDDM principles in local municipalities.** LMs lack the will and the required skills. Most risk management decisions are experience or belief based rather than data-driven.	**Module: List and links to common data sources.** **Module: Statistics of prior released risk events.** The tool will list up and provide easy access (via links) to basic data sources and other national guidance materials to make risk assessment more data-driven.
4.2	**Data accessed freely through SE is too general for municipalities.** Municipalities have access to county level information but there are different municipalities in	**Module: List and links to common data sources.** The tool should list up and provide easy access (via links) to basic data sources and other

	one county. Asking for specific information regarding the municipality is too expensive.	national guidance materials to make risk assessment more data-driven.

The second category of constraints have been underlined while developing the deliverables 2.2 and 2.3. During international practice review we identified aspects of other countries' crisis management systems that would be useful, but which are currently absent in the Estonian approach to crisis management. Additional constraints and gaps were highlighted during co-creation workshops and designing functionalities which would be required for the methodology toolkit. These additional constraints and gaps can be found in the table below.

Table 2. Gap-analysis based on additional constraints

No	Constraint	Potential gap-fill from the tool
	Organisational and governance	**Organisational and governance**
1	**LMs may undermine certain risk events.** LMs either have not thought about certain types of risks, or they incorrectly assume that certain types of risks are very improbable to happen. Also, based on international practice review, the countries which have written down all different types of risks, tend to be better prepared once a crisis occurs. Many countries have adopted the all-hazards approach.	**Module: Collection of risks.** **Module: Statistics of prior realised risk events.** A predefined collection of different risks which might happen in or affect LM-s will help to make sure relevant risks are not overlooked. To highlight the possible occurrence of these risk events we will (where possible) also provide a statistical overview of the past events that have taken place in the LM, region or in the country. This would aid LMs to better assess the likelihood of certain risk events.
2	**Local municipalities have a wide range of services which they have to provide on a daily basis – it is hard to understand their interrelations and prioritise between them during a crisis.** Some crises will affect the number of LM's services and provision of some LM's services are heavily reliant on other services. Scarce resource needs to be allocated to service restoration based on priorities. LMs don't often realise the interdependencies between the services and are struggling to determine which services need to be restored as a first priority.	**Module: List of local municipality services.** **Module: Local municipality profile.** **Module: Examples of cross-dependencies and domino effects.** We will provide LMs with a list of critical services for prioritisation. Examples of service interdependencies will allow LMs to better understand which key services warrant extra attention in their particular circumstances.
3	**Lack of vulnerability assessment** Based on the international practice review, one of the key aspects in preparedness assessment is understanding what the capacities are for handling the crisis and where the potential vulnerabilities are. Currently, Estonian authorities do not have a systematic vulnerability analysis on any level of the crisis management system. Consequently, the magnitude of potential risk events may not be adequately assessed.	**Module: Scenario-based vulnerability assessment.** The methodology will aid LM-s to carry out their vulnerability assessment. A scenario-based vulnerability assessment would provide guidance to understand what kind of resources are at risk or required to deal with the risk scenario. This will allow them to understand their preparedness gaps and motivate precautionary actions to increase the preparedness.

4	**Inconsistency in LM's initial response plan details.** Some of the LMs have already created their own initial response plan activity list in case of a crisis event taking place. However, this is not a common practice among LMs. During the co-creation workshop, it was mentioned by several LMs that having an initial list of activities for the first phases of an emergency would benefit them, as it limits the time consumed by preliminary planning and allows the crisis managers to start their initial tasks immediately.	**Module: Acute crisis initial response plan activity list.** We will assemble guidance materials and requirements for a good crisis management plan for acute crises, however, each municipality can design their specific plan according to the local conditions and division of crisis management responsibilities. An activity list for an acute crisis response would keep the initial response for a crisis more structured and reduce chaos. This would result in a more effective response and aid the LM in overcoming the crisis.

Disaster loss:

As mentioned in the previous reports, Estonian approach to crisis management does not account for disaster loss, therefore, there is no systematic disaster loss management system and identifying specific gaps in the system is not possible due to the non-existent system. However, to improve the current maturity level of disaster loss management, we will establish a methodology and guidance based on the international practice review and co-creation workshops with the GO. As a part of that methodology, we will highlight the data needs to systematically collect and analyse disaster loss data.

There is no shared disaster loss methodology currently used in any levels of the Estonian crisis management system, we will develop a suitable use-case for the methodology which would most suit the needs of the GO, crisis management agencies, ministries and/or LMs.

3 To-be scenarios

3.1 Context and methodology of the development of to-be scenarios

There are multiple different options on which modules and functionality to include in the methodology. These alternatives and options are discussed with the Beneficiary and decided upon on an ongoing basis, engaging stakeholders where necessary. The inclusion of different modules was decided based on the constraints and gaps identified (see also gap analysis in Chapter 0) and detailed alternative functionalities considered during the creation of the methodology toolbox can be found in Appendix 2.

As agreed with the Beneficiary, it is the implementation of the methodology where different scenarios can be anticipated and therefore, alternative scenarios should be built for implementation approaches.

In most cases, the scenario analysis describes complete all-round to-be scenarios that can be compared to each other and select the best fit scenario. In our case, we have 10 different areas for which different implementation alternatives can be considered. This would allow hundreds of different all-round scenarios to be built and as such, the classic scenario approach is not reasonable. Instead, we have presented alternatives to all 10 different areas and the decisions can be made area by area. We will evaluate each decision point separately making the selection of the most suitable scenario easier for the GO and other relevant stakeholders.

Figure 3. The 10 areas for implementation of municipalities risk management toolbox

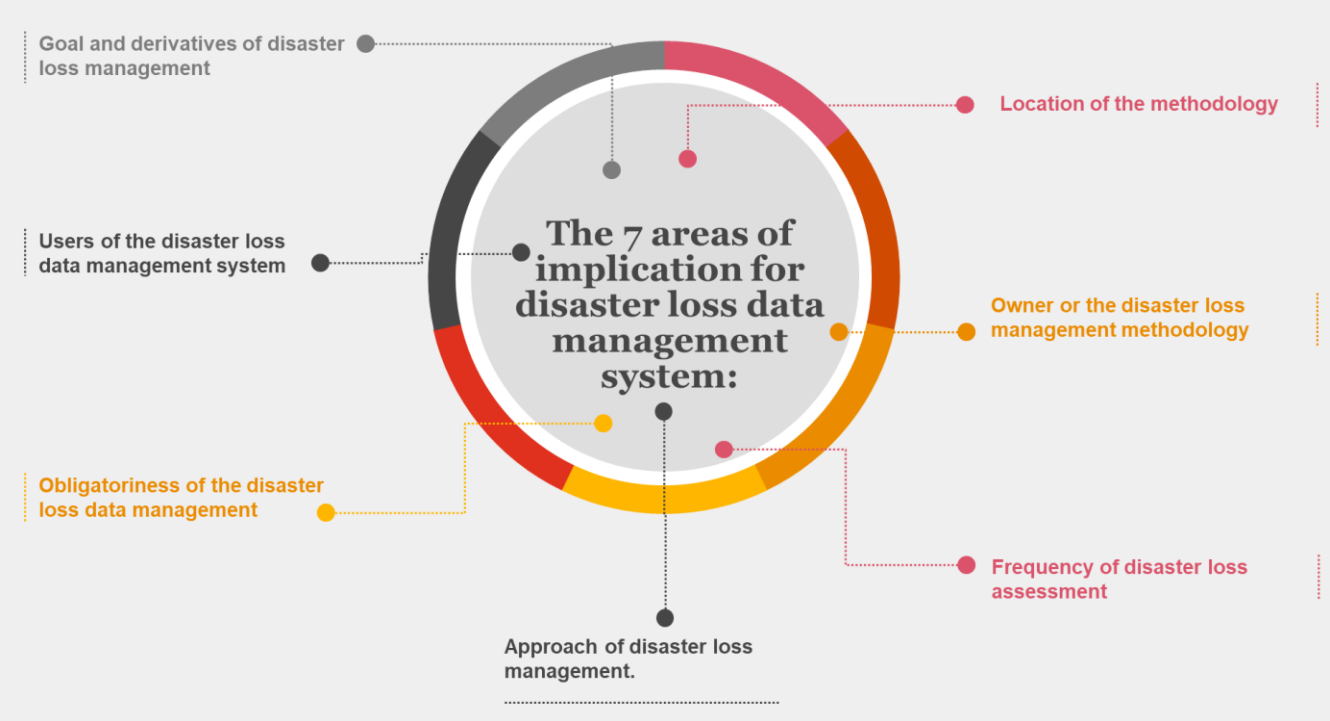


The following chapter will give an overview of all the decision points and alternatives considered for local municipalities risk management toolbox (see Figure 3) and for disaster loss methodology (see Figure 4). After each decision point there is a summary where we provide a recommendation regarding which of the scenarios would be preferred, followed by supporting arguments highlighting our considerations.

Similarly to the functionality analysis, as the main users of the scenario analysis are the local stakeholders, the scenario analysis written in Estonian. In Chapter 5, there is a summary of the recommendations made, based on the scenario analysis

In addition to the scenario analysis, this chapter will provide an overview of the critical uncertainties concerning the implementation of the municipalities' risk and crisis management toolbox and the disaster loss methodology. Uncertainties concerning the municipalities' toolbox can be found in Chapter 3.4 and uncertainties concerning the disaster loss methodology in Chapter 3.7.

Figure 4. The 7 areas of implication for disaster loss methodology



3.2 Implementation scenarios for the local municipalities' risk management methodology (in Estonian)

3.2.1 KOV riskihindamise metoodika kasutajad

Selle stsenaariumi puhul on eesmärk mõista, milline kriisijuhtimise tase peaks vastutama selle eest, et kohaliku omavalitsuse tasandil oleksid riskid hinnatud. Näiteks, kas KOV peab tegelema enda riskide hindamisega ise või tooks paremaid tulemusi see, kui uus riskihindamise metoodika suunaks vastutuse KOV-ide kriisi riskihindamise eest selgelt välja KOV-i vastutusalast ja teeks sellest mõne teise osapoole kohustuse. Alljärgnev tabel annab ülevaate teguritest, millega arvestada, kui valida erinevate rakendustasemete vahel.

Table 3. KOV riskihindamise metoodika kasutajad

	Stsenaarium 1	Stsenaarium 2	Stsenaarium 3	Stsenaarium 4
Kirjeldus	KOV riskide hindamine on kohustuslik **KOV-idele.**	KOV riskide hindamine on kohustuslik **regionaalsetele** kriisikomisjonidele (nt Päästeameti juhtimisel).	KOV riskide hindamine on kohustuslik **vastutavatele asutustele,** nende riskide ulatuses, mis kuuluvad nende vastutusalasse.	KOV riskide hindamine on kohustuslik **ministeeriumitele või Riigikantseleile.**
Plussid	• KOV-id hindavad ise oma riske ja individuaalset valmisolekut, mitte ei looda teiste osapoolte peale. Analüüsi tulemused vastavad KOV tegelikule võimekusele ja jätavad kõrvale toetuse, mille kättesaadavuses nad ei saa olla täielikult kindlad. • Juhul kui KOV-id ise riskide hindamisega tegelevad, on nad ka teadlikud enda rollist, haavatavustest ja valmisolekust. Tõenäosus, et KOV ennetavaid tegevusi või ettevalmistusi teeb on suurem juhul kui ta ise on olukorda analüüsinud, mitte lihtsalt saanud sisendit. • Riskide realiseerumisel on nad kõige esmane ja kõige lähedasem osapool ja KOKS-ist tulenevast rollist lähtuvalt tuleb neil oma kodanike eest hoolitseda ja vajalikke teenuseid pakkuda. • Eesti tänane halduskorraldus näeb ette, et kohaliku elu puudutavate küsimustega peaks tegelema KOV.	• Metoodika rakendamine regionaalsetes kriisikomisjonides võimaldaks tekitada kriisijuhtimisele ka regionaalse vaate. Rahvusvahelise praktika analüüs rõhutab regionaalse vaate olulisust. • Regionaalne vaade võimaldaks koondada KOV-ide sisendit, seda laiendades ja valideerides. • Regionaalne vaade aitaks vältida seda, et ressursid (nt teenusepakkujate või PäA ressursid), millega arvestatakse ei oleks duplikaadid. • Enamus kriisisündmused ei piirdu vaid ühe KOV-iga, mistõttu regionaalne koostöö riskide hindamisel ja valmistumisel on vajalik. Regionaalsel tasemel riskide hindamine võimaldaks hinnata paremini mitmeid KOV puudutavaid riskisündmusi.	• Kui kõik kasutaksid sama metoodikat, lihtsustaks see riigiriskiraporti loomist. • Vastutavatel asutustel on oma valdkonna riskidest (ja nende regionaalsest paiknemisest) põhjalik ülevaade	• Kui kõik kasutaksid sama metoodikat, lihtsustaks see üleriigilise riigiriskiraporti loomist.

Miinused	• KOV eelarve võimalused panustada riskide ja haavatavuse hindamisse, aga ka maandamise meetmete rakendamisse või ettevalmistuste tegemisse on piiratud. • Riski- ja kriisijuhtimise kompetentsid KOV töötajate hulgas on piiratud. Lisaks on kriise valdkonnale spetsialiseerumine võimalik vaid suuremates omavalitsustes. Enamuses ei ole võimalik spetsialiseerumine ja kriisijuhtimise küsimustele keskendumine, mistõttu riskianalüüsi kvaliteet võib jääda nõrgaks.	• Tänane Eesti halduskorraldus ei sisalda regiooni tasandit, millel oleks oma struktuur ja ülesanded. • Regionaalne kriisikomisjoni tänane funktsioon on KOV-ide ja riigiasutuste vahelise infovahetuse võimaldamine. Väljaspool kriisiolukorda kohtub reg. kriisikomisjon vaid 4 korda aastas.	• Vastutavate asutuste ressursid (nii eelarve kui ka inimesed) on piiratud. Riskianalüüside koostamine on vaid üks paljudest ülesannetest, mida vastutav asutus täidab. • Vastutaval asutusel on vähem ligipääsu KOV puudutavale informatsioonile ning puudub piisav teadmine konkreetse kohaliku omavalitsuse spetsiifilistest oludest. • Eesti tänane halduskorraldus näeb ette, et kohaliku elu puudutavate küsimustega peaks tegelema KOV.	• Riigikantselei ja ministeeriumite ressursid on piiratud ning nende ülesanne ei ole analüüsida spetsiifiliselt iga 79 KOV riskipilti ja olukorda. • Riigikantseleil ja ministeeriumitel on vähem ligipääsu KOV puudutavale informatsioonile kui KOV-il endal ning puudub piisav teadmine konkreetse kohaliku omavalitsuse spetsiifilistest oludest. • Eesti tänane halduskorraldus näeb ette, et kohaliku elu puudutavate küsimustega peaks tegelema KOV.

Soovitus:

Stsenaarium 1 – loodava metoodika rakendamisega ning riskide hindamisega tegelema eelkõige KOV-id ise, sest nende teadlikkuse tõstmisest tulenev kasu on kõige suurem. Lisaks on KOV osapool, kellel on kõige rohkem vahetut informatsiooni oma piirkonna, inimeste ja vajaduste osas. Kuigi sõltumata sellest, millisele tasemele KOV riskide hindamise ülesanne paigutada, kaasneb sellega täiendava ressursi vajadus, siis KOV tasandil tuleb KOV-il tegeleda vaid iseend puudutava olukorraga ja lisaks sellele on see kuluefektiivsem, sest üldine olukorra teadlikkus on KOV-il juba olemas. Muud riigiasutused tugineksid ilmselt KOV sisendile, mis looks teatavat ebaefektiivsust.

Pikemas perspektiivis soovitame kaaluda ka regionaalse tasandi tugevdamist (**Stsenaarium 2**), ehk tekitada regionaalsetele kriisikomisjonidele suurem roll kui kõigest informatsiooni vahetamine. Regionaalse vaate loomise eelduseks on aga teadlikud KOV-id, kes regionaalsele tasandile sisendit annavad – KOV-ide koostöös on võimalik riskikaardistust ja valmisolekut laiendada. Sarnast praktikat kasutatakse hetkel Rootsis, kus kogutakse regiooni tasandil kõik KOV-ide poolt loodud riskidokumendid kokku, misjärel luuakse ka regiooni tasemel riskihinnang. See loob täiendava motivatsiooni KOV-ile oma riskianalüüsiga tegeleda, sest see ei ole vaid dokument, mis luuakse nö sahtlisse, vaid seda kasutavad ka teised ning erinevate KOV-ide sisend täieneb regionaalse vaatega.

3.2.2 Riskide hindamise kohustuslikkus

Järgmisena tuleks määrata, kas KOV-il peaks olema **kohustus** oma riske regulaarselt hinnata või mitte. Sellest otsusest sõltuvad ka mitmete edasiste alternatiivide valikukohad. Eelmise küsimuse baasil tehtud soovitusest järeldub, et KOV-il oleks kasulik oma riske ise hinnata (mitte lasta seda teistelt tasanditelt enda jaoks teha). Seega tõstatatud küsimus, kas riskide hindamine peaks olema seadusest tulenev kohustuslik nõue ja kuivõrd täpseid juhiseid see nõue KOV-ile ette andma peaks. Kohustuslikuks tegemine eeldab kindlasti muudatusi olemasolevates seadustes (näiteks KOKS või VOS).

Table 4. Riskide hindamise kohustuslikkus

	Stsenaarium 1	Stsenaarium 2
Kirjeldus	Muuta riskianalüüs KOV-idele **kohustuslikuks**, kuid analüüsi läbiviimine dokumenteerimine ja spetsiifilised väljundid, mida analüüsi käigus luua, jätta **vabatahtlikuks**.	Jääda tänase olukorra juurde, kus KOV-idel **pole kohustust** riskianalüüsi koostada. Loodav metoodika toetab KOV-e analüüsi läbiviimisel, kui neil on soov oma riske analüüsida.
Plussid	• Riskianalüüsi kohustuslikkus suunab KOV oma riskikeskkonna peale mõtlema ja tõstab tänasega võrreldes KOV-ide riskiteadlikkust. • Tulemite dokumentatsiooni vabatahtlikkus võimaldab KOV-il viia riskianalüüsi ellu vastavalt võimetele ning kohandada tulemeid konkreetse KOV spetsiifika järgi. • Tulemite dokumentatsiooni vabatahtlikkus suunab KOV-e tegelema rohkem sisulise riskihindmise mitte vormi täitmisega.	• Puudub vajadus KOV riskianalüüse kontrolliva osapoole järele. • KOV-id saavad riskihindamisega tegeleda sisulise vajaduse järgi.
Miinused	• Ei pruugi olla efektiivne, kuna KOV-id võivad hiilida riskianalüüsi tegemisest kõrvale ja selle kontrollimine on raskendatud, sest puuduvad kohustuslikud dokumendid või tegevused, mille olemasolu kontrollida. • Selleks, et olla kindel, riskianalüüs on sisuline, on vajalik ka kvaliteedi kontrolli funktsiooni loomine. See on täiendav koormus osapoolele, kelle ülesandeks see saab. • Kuna KOV-id on autonoomsed, ei tohi neile ilma rahastuseta lisakohustusi panna. Juhul kui riik paneb KOV-ile täiendava kohustuse, tuleb suurendada ka KOV-ide rahastust vastavalt.	• Vabatahtlikult riskianalüüside koostamine ei ole KOV-ide seas laialt levinud tulenevalt probleemidest inimressursi leidmisega, huvi puudumisega, teadmatusega. • Ilma täiendavate motivatsioonimeetmeteta on raske ette näha laialdast riskihindamise läbiviimise alustamist KOV-ides, mistõttu KOV riskiteadlikkus tänasega võrreldes oluliselt ei tõuse.

Soovitus:

Stsenaarium 1 – ehkki antud momendil ei ole KOV-idele riskihindamise kohustust ja ka VOS ei ole plaanide kohaselt seda kohustust seadmas, soovitame riskide hindamise kohustuse seadmist KOV-idele. Kuna KOVidel on palju kohustuslikke ja vabatahtlikke ülesandeid, mida täita tuleb, siis kohustuslik riskide hindamine aitaks seletada selle vajalikkust ka volikogu liikmetele.

Alates hetkest, mil KOV-idel kaotati riskianalüüside koostamise kohustus, on vaid väga vähesed KOV-id regulaarselt oma riske hinnanud ja end kurssi viinud muutustega oma riskikeskkonnas. Meie arvates ei ole realistlik eeldada, et ainult metoodika ja juhiste kättesaadavuse suurendamisel KOV-ide riskiteadlikkus ja valmisolek laiapõhjaliselt ja lühikeses ajaraamis oluliselt paraneksid, mistõttu soovitame riskianalüüsi kohustuse kehtestamist KOV-idele. Kohustuse seadmisele peaks lähenema järk-järgult ja paindlikult ja võimaldada KOV-il seada esialgu ise prioriteete ja viia analüüsi ellu oma võimete piires ja endale vajalikke väljundeid luues. Metoodika loomine ja juhendmaterjalide tegemine aitaks neil kohustusliku riskianalüüsi läbiviimise nõuet mõistliku pingutusega täita.

3.2.3 Metoodika kohustuslikkus

Kui muuta riskianalüüsi läbiviimine kohustuslikuks, siis on järgmine loogiline küsimus see, kuidas KOV seda kohustust täitma peaks – kas täpselt väljundite küsimusi järgides ja ühetaolisi metoodikaid rakendades või suurema vabadusega ise oma lähenemisviise valides ja kohandades.

Table 5. Metoodika kohustuslikkus

	Stsenaarium 1	Stsenaarium 2	Stsenaarium 3
Kirjeldus	**KOV-idel Kohustuslik kasutada ühtset metoodikat ning fikseerida tulemid etteantud vormidel.** Metoodika kasutamise järel tekkinud dokumendid on kõik ühes struktuuris vormistatud.	Tööriistakast pakub erinevad metoodikad, mille abil riske ja oma valmisolekut hinnata. KOV saab **valida tööriistakastist enda jaoks sobivaima lähenemise**, kuid soovi korral kasutada ka mõnd muud metoodikat. Oluline on, et KOV-id oma riske hindaks. Vabalt valitud metoodika kasutamise järel tekkinud **tulemid on standardiseeritud** ning dokumendid sisaldavad ka metoodika kirjeldust, mis muudab tulemid võrreldavaks ka siis kui erinevad KOV-id on erinevaid metoodikad kasutanud.	Dokumendid ei pea olema võrreldavad ja samale metoodikale tuginevad. See tähendab, et KOV-idele on kõik materjalid ette antud vaid näidistena ning **riskianalüüsi lähenemine ning tulemite fikseerimise vorm on täielikult vaba.**
Plussid	• Erinevate KOV-ide poolt koostatud dokumendid on tänu ühtsele metoodikale ja struktuurile võrreldavad. See lihtsustab kvaliteedi hindamist. • Võrreldav metoodika võimaldab KOV-idel tulemeid omavahel võrrelda ja jagada ja riigiülese terviku kokku panna. • Tõenäoliselt ei pea tööriista koordineeriv asutus (eelduslikult PäA) KOV metoodika kasutamisel palju juhendama ja suunama, sest lähenemine on ühtne.	• Igal KOV-il on võimalus valida endale vajaduste, võimaluste ja võimekustega sobiv metoodika. • Riskianalüüs on protsess, mida KOV peaks läbi tegema, et ise olla paremini valmis, mitte lihtsalt spetsiifiliste kohustuslike vormide täitmine. • Metoodika on kohaldatav ja sobitub nii suurtele kui ka väikestele KOV-idele. • Võrreldav metoodika võimaldab KOV-idel tulemeid omavahel võrrelda ja jagada, tulemid on vormilt sarnased, mistõttu saab nende baasil kokku panna ka riigiülese terviku.	• Iga KOV saab valida endale meelepärase metoodika (vastavalt enda pädevusele) ja seda kasutada. • KOV-ide riskianalüüsid saavad olla erinevas detailsuses, vastavalt võimekusele ja vajadusele.
Miinused	• On raske leida metoodikat, mis oleks sobiv kõikide KOV-ide vajaduste ja võimekustega (nt sobiv suurtele kui ka väikestele KOV-idele. • Lähenemine ei ole kohandatav, mistõttu võib ta suurema võimekuse ja keerukamate riskidega KOV-idele vähe kasulik, samas kui	• Kasutatud metoodikast ülevaate andmine on täiendav ajakulu. • Kuna eri KOV-ide poolt loodud dokumendid võivad olla loodud erinevaid metoodikaid kasutades peab ka kvaliteedijärelevalve olema sisukam ja on seetõttu aeganõudvam.	• Kuna eri KOV-ide poolt loodud dokumendid võivad olla loodud erinevaid metoodikaid kasutades peab ka kvaliteedijärelevalve olema sisukam ja on seetõttu aeganõudvam • Infovahetus KOV-ide vahel ja dokumentide jagamine on raskendatud, tulemid on erinevates

väikestele ja madalama võimekusega KOV-dele liiga keeruline.

vormides ning teistel osapooltel on neid raskem mõista.

- KOV-id, kes ei pea riskijuhtimisega seonduvaid tegevusi tähtsaks, valivad ilmselt vähimat võimalikku pingutust nõudva lähenemise.

Soovitus:

Stsenaarium 2 – juhul kui võtta arvesse meie eelmist soovitust ja muuta KOV-del riskide hindamine kohustuslikuks, kuid võimaldada sealjuures paindlikkust, soovitame siinkohal valida stsenaarium 2 ehk alternatiivi, mis sellise lähenemisega kõige paremini sobitub. Metoodika peaks toetama KOV-ide tegevust pakkudes erinevaid alternatiive, mida KOV-id kasutada saaksid. Juhul kui KOV-id nende hulgast endale sobivat lähenemist ei leia, võiks neil olla võimalus kasutada ka mõnd alternatiivset metoodikat. Selline lähenemine on kõige paindlikum ja suunab KOV-e ise oma vajadustest lähtuvalt tegutsema.

Juhul kui riskianalüüs aga KOV-idele kohustuslik ei ole, ei saa muuta kohustuslikuks ka ühegi metoodika kasutamist. Sel juhul saab loodav tööriistakast luua lisandväärtust vaid nendele KOV-idele, kes riskide hindamist niigi oluliseks peavad ning sellega tegelevad.

3.2.4 Sagedus

Kuivõrd KOV-ide riskikeskkond ja olustik on ajas muutumas, siis on oluline, et nii riskide hinnanguid, mõjusid kui ka KOV haavatavust regulaarselt üle vaadatakse ja uuendatakse.

Table 6. Sagedus

	Stsenaarium 1	Stsenaarium 2	Stsenaarium 3	Stsenaarium 4
Kirjeldus	Riskianalüüsi ja võimekuste hindamist viiakse läbi vajaduspõhiselt, kuid mitte harvem kui **1 kord aastas.**	Riskianalüüsi ja võimekuste hindamise sageduseks on **kord 4 aasta jooksul** (ehk ühe volikogu tavapärase valitsusperioodi jooksul).	Riskianalüüsi läbiviimise toimub vajaduspõhiselt, kuid mitte harvem kui **kord 2 aasta jooksul** ja võimekuste hindamise sagedus on **kord aastas.**	Tööriista kasutamise sagedus **ei ole määratletud.**
Plussid	• Kuna väljundid tuleb üpris tihti üle vaadata, on KOV-id konstantselt teadlikud enda riskidest ning oskavad kriisidele paremini reageerida.	• Ajaraam paindlik selleks, et KOV saaks leida endale sobiva aja riskianalüüsi läbiviimiseks.	• KOV-id hoiavad regulaarselt silma peal oma haavatavusel, mis võib ajas muutuda kiiremini kui riskikeskkond.	• KOV-id tegelevad kriisijuhtimise metoodikaga siis, kui neil selleks aega on, ehk teised (ajakriitilisemad)

	Riskianalüüsid ja võimekuste hindamised on pidevalt uuendatud ja ajakohased. • Kuna riskide ja võimekuste hindamine on korduv KOV-i ülesanne, on suurem võimalus, et KOV määrab selle tarbeks kindla vastutava isiku, kellel tekib võimalus spetsialiseerumiseks. • Võimaldab KOV-il erinevatel aastatel keskenduda riskianalüüsis erinevat tüüpi riskidele.	• Pikem ajaraam võimaldab teha põhjalikumaid analüüse. • Kord valimistsüklis tehtud analüüsid võimaldavad ka värskelt valitud volikogul seada prioriteete ennetuse ja ettevalmistuste osas, mida ette võtta valitsemisperioodi vältel.	• Kuna haavatavuse hindamine on korduv KOV-i ülesanne, on suurem võimalus, et KOV määrab selle tarbeks kindla vastutava isiku, kellel tekib võimalus spetsialiseerumiseks. • Regulaarne haavatavuse hindamine tuletab KOV-le iga-aastaselt meelde vajadust oma vastupidavust tõsta.	KOV-ülesanded ei kannata selle arvelt.
Miinused	• Liiga tihe ülevaatamine võib lõppeda liiga pealiskaudse suhtumisega, ehk KOV-il võib tekkida „alles ju tegime, midagi pole muutunud“ tüüpi suhtumine. • Põhjalikud iga-aastased riskianalüüsid on KOV-ile suur lisakoormus ning ajakulu.	• Pikk periood võimaldab riskianalüüsi edasi lükata, mistõttu sagedus ei pruugi olla piisav, sest olustik, eriti võimekused võivad olla ajas muutuda.	• Liiga tihe võimekuste hindamine võib lõppeda pealiskaudse suhtumisega, ehk KOV-il võib tekkida „alles ju tegime, midagi pole muutunud“ tüüpi suhtumine.	• Kui metoodika kasutamine teha kohustuslikuks, aga jätta sagedus piiritlematus, võivad KOV-id selle kasutamist lükata teadmata tulevikku.

Soovitus:

Stsenaarium 3 – KOV-idel tuleks riskipildi hindamisse suhtuda paindlikult ja vajaduspõhiselt. Üldjuhul KOV riskipilt tervikuna aastate lõikes palju ei muutu, kuid erinevate ohtude relevantsus võib spetsiifiliste arengute tulemusel muutuda ka järsku. Näiteks viimastel aastatel on olnud kõrgendatud riskid epideemia, sisserände ja ulatuslike elektrikatkestuste valdkondades. Lähtudes levinud rahvusvahelisest praktikast on optimaalne korrigeerida riskihinnangu spetsiifilisi valdkondi jooksvalt, vastavalt spetsiifiliste riskide tõstatumisele. Selle lisaks oleks vaja vaadata riskianalüüse laiemalt üle vähemalt kord kahe aasta jooksul. Võimekus sõltub aga paljuski KOV-i olustikust, kriisi valmisolekuks kasutatavatest vahenditest, inimressursist ja koostöökokkulepetest. Need aspektid võivad olla ajas väga muutlikud ja seetõttu peaks KOV oma võimeid üle hindama vähemalt kord aastas. Võimekuste hindamise võiks siduda ka aastase eelarvetsükliga, kuna analüüsi tulemusel võib selguda vajadus teatud kulutuste/investeeringute tegemiseks.

3.2.5 KOV riskianalüüsi rahastamine ja KOV-ide motiveerimine

Lisarahastuse küsimus kerkib päevakorda kui riskianalüüs KOV-ile kohustuslikuks muuta, sest lähtudes KOV-ide autonoomiast tuleb riigil korvata lisakohustustega kaasnevad kulutused. Juhul kui jätkata vabatahtliku riskianalüüsiga on ka ilmne, et tänase korraldusmudeli puhul on proaktiivset motivatsiooni riske analüüsida KOV-ide seas vähe. Selleks, et riskianalüüsist saadavad kasusid saavutada, tuleks KOV-e täiendavalt motiveerida

riskianalüüse läbi viima. Alternatiive riskianalüüsi ja kriisideks valmistumise motiveerimiseks on erinevaid ja alljärgnev tabel annab kokkuvõtliku ülevaate võimalikest lähenemisviisidest.

Table 7. KOV riskianalüüsi rahastamine ja KOV-ide motiveerimine

	Stsenaarium 1	Stsenaarium 2	Stsenaarium 3
Kirjeldus	Kõikidele KOV-idele eraldatakse **riigieelarvest täiendavaid rahalisi vahendeid**, mida KOV-id saavad kasutada kriisijuhtimise tegevustele.	KOV-idele eraldatakse riigieelarvest sihtotstarbeliselt riski- ja kriisijuhtimise tegevusteks ressurssi. Juhul kui KOV raha sihtotstarbeliselt ei kasuta, siis riik võib eraldatud raha tagasi võtta**.** Sellist süsteemi kasutatakse näiteks hetkel Rootsis ning nende praktika põhjal toimib süsteem hästi.	KOV-id ei saa lisarahastust, kuna riskianalüüsi koostamist ei tehta seaduslikult kohustuslikuks või raamistatakse riskianalüüs osana juba tänaste kohustuste täitmisest.
Plussid	• Lisarahastus vähendab probleemi, et KOV pole piisavalt ressurssi, et riski- ja kriisi juhtimise tegevustesse panustada.	• Rahastus võimaldab ja motiveerib KOV-i tegelema kriisiteemadega. • Rahastuse sihtotstarbelisus ei lase rahastust muude päevapoliitiliste küsimuste tarbeks kasutada.	• Ei ole vaja riigieelarves täiendavaid kulutusi teha.
Miinused	• Kuna KOV-id on autonoomseid, siis ei pea nad eraldatud raha (täielikult) kriisijuhtimise tegevustesse suunama – ressursside kasutus ei pruugi olla eesmärgipärane. • Riigieelarvest täiendavate vahendite suunamine KOV-idele võib osutuda poliitiliselt keeruliseks. Ka riigieelarve aruteludes võivad päevapoliitilised küsimused olla olulisemad kriisivalmisolekust.	• Riigieelarvest täiendavate vahendite suunamine KOV-idele võib osutuda poliitiliselt keeruliseks. Ka riigieelarve aruteludes võivad päevapoliitilised küsimused olla olulisemad kriisivalmisolekust. • Sihtotstarbeline rahastus vajab kontrolli funktsiooni ja kontrolli põhimõtete väljatöötamist otsustamaks, et mis olukorras ei ole KOV piisavalt teinud kriisivaldkonnas ja õigus neile eraldatud raha tagasi võtta. • Sihtotstarbelise lisarahastuse andmine looks pretsedendi ja KOV-i ootused ka muude	• KOV-idele ei saa ilma lisarahastuseta jagada uusi kohustusi – metoodika kasutamine ja uued ülesanded saavad olla vaid soovituslikud. • Suure tõenäosusega ei oleks osa KOV-e ilma rahastuseta motiveeritud et tegeleda riski- ja kriisijuhtimisega. Jätkub tänane olukord, kus KOV-ide riskiteadlikkus ning teemaga tegelemise motivatsioon on madal. • Kui ka raamistada riski-ja kriisijuhtimise tegevused kui osa tänaste ülesannete täitmisest, siis sihtotstarbelise rahastuse puudumine võib tähendada, et tegevused saavad tähelepanu minimaalselt ja ennetavad

	tegevuste suhtes. See ei pruugi olla riigi vaatest põhjendatud.	investeeringu jäävad ressursside puudumise tõttu tegemata.

Soovitus:

Stsenaarium 2 – kuna kriisijuhtimine on KOV jaoks suuresti täiendav ülesanne, on lisarahastuse võimaldamine oluline. See võimaldaks KOV-il keskenduda kriisijuhtimise tegevustele ilma, et teised KOV ülesanded samaaegselt kannataksid. Lisarahastus võimaldaks KOV-il arendada inimeste pädevusi, viia läbi riskianalüüse (kas iseseisvalt või koos välise osapoole toetusega), korraldada õppusi, tõsta kriisideks valmisolekut, vähendada haavatavust läbi valmisoleku tõstmise jms. Raha efektiivse kasutamise tagamiseks peaks lisarahastus olema sihtotstarbeline ja kasutamine lubatud vaid nende tegevuste tarbeks, mis tõstavad KOV riskiteadlikkust, vähendavad haavatavust või parandavad kriisivalmisolekut taset.

3.2.6 KOV-ide kriisijuhtimise metoodika ja tööriistakasti omanik ja eestvedaja

Nii kohustusliku kui ka vabatahtliku riskide hindamise puhul on oluline, et oleks määratud vastutav osapool, kelle ülesandeks on „tööriistakasti“ hooldamine, metoodikate kasutamise propageerimine ja vajadusel kasutajate juhendamine. Võttes arvesse Eesti tänast kriisijuhtimise korraldusmudelit, on metoodika tööriista omanikuks kaks võimalikku kandidaati – Päästeamet, kes koordineerib KOV-ide kriisijuhtimise tegevusi ja Riigikantselei, kust antakse suuniseid kogu riikliku kriisijuhtimise poliitika kujundamiseks.

Table 8. KOV-ide kriisijuhtimise metoodika ja tööriistakasti omanik ja eestvedaja

	Stsenaarium 1	Stsenaarium 2
Kirjeldus	**Päästeamet** on KOV kriisijuhtimise tööriistakast omanik ning vastutab metoodika uuendamise, KOV-ide juhendamise ja tulemite kontrollimise eest.	**Riigikantselei** on KOV kriisijuhtimise tööriistakast omanik ning vastutab metoodika uuendamise, KOV-ide juhendamise ja tulemite kontrollimise eest.
Plussid	• PäA esindajad on olnud seni KOV-idele riskiteemadel peamisteks kontaktisikutes. Päästeameti esindajad tunnevad KOV-ide kontakte ja omavad ülevaadet peamistest probleemidest ja arendusvajadustest. • Päästeamet on juba loonud KOV-idele erinevaid juhendmaterjale ja õppekeskkondi, millega metoodika tööriist hästi sobituks. Juhul kui tööriist asub PäA loodud õppeplatvormil, oleks struktuurselt lihtsam ka see, kui nii platvormi omanik kui metoodika omanik oleks samas asutuses. • PäA on regionaalselt esindatud ja seetõttu KOV-ile lähemal, mõistab paremini kohalikke olusid ja vajadusi.	• Riigikantselei halduses on SITIKAS infosüsteem, mis koondab kokku riskide monitoorimiseks vajalikku operatiivinformatsiooni. Juhul kui tööriistakast saab asuma Riigikantselei SITIKAS infosüsteemis, on hea kui platvormi omanik ja metoodika omanik on sama asutus.

Miinused	• Vajab täiendavat inimressurssi, mis tähendab kas täiendava(te) inimes(t)e värbamist või ülesannete rõhuasetuse muutust.	• Vajab täiendavat inimressurssi, mis tähendab kas täiendav(te) inimes(t)e värbamist või ülesannete rõhuasetuse muutust. • Riigikantselei ei ole seni olnud KOV-i nõustavas ja juhendavas rollis, seega seda rolli täitma hakkamine oleks täiendav, sisse harjumist vajav ülesanne. • KOV-i juhendavas rollis on PÄA, mis tähendab, et olukorras, kus PäA jätkab KOV-i juhendamist ja nõustamist, kuid sarnast ülesannet hakkab täitma ka Riigikantselei, siis KOV-i vaates muutub olukord segasemaks. Vastutuste jaotus PäA ja Riigikantselei ülesannete vahel muutuks häguseks.		

Soovitus:

Stsenaarium 1 – kuna metoodika omaniku roll sobitub kõige selgemalt PäA tänase rolliga, soovitame KOV kriisijuhtimise metoodika omanikuks Päästeametit. PäA jaoks tähendaks see kõige vähem rolli muutust võrreldes tänase olukorraga ja on kõige efektiivsem lahendus.

3.2.7 KOV kriisijuhtimise tööriistakasti tehniline hoiustamine

Selleks, et KOV-idel oleks tööriista võimalikult mugav ja efektiivne kasutada, tuleks metoodika paigutada veebikeskkonda, mis juba eksisteerib ja millega KOV-id juba varasemast tuttavad on. Vastasel juhul on KOV-idel raskem metoodikat kasutusele võtta.

Table 9. KOV kriisijuhtimise tööriistakasti tehniline hoiustamine

	Stsenaarium 1	Stsenaarium 2	Stsenaarium 3	Stsenaarium 4
Kirjeldus	Metoodika/tööriista asukoht: **PäA kriisijuhtimise e-õppekeskkond.**	Metoodika/tööriista asukoht: **RaM Minuomavalitus.ee keskkond.**	Metoodika/tööriista asukoht: **Riigikantselei SITIKAS infosüsteemis.**	**Uus lahendus**, mis on loodud majutamaks KOV kriisijuhtimise tööriista.
Plussid	• Keskkond sisaldab juba tänaseid PäA poolt KOV-idele loodud kriisijuhtimise õppematerjale. Kui sinna lisada ka riskhindamise tööriistakasti materjalid ja metoodika, siis on KOV-il üks selge	• KOV-ide jaoks juba tuttav keskkond. • Keskkond on kõigile ligipääsetav ja lihtsasti mõistetav.	• Infosüsteem on piiratud ligipääsetavusega, kuid KOV-idele ligipääsu tekitamine on võimalik. Osad KOV-id on ka	• Kuna tegu on uue süsteemiga, mida luuakse spetsiaalselt KOV tööriistakasti tarbeks, on seda kõige lihtsam

	platvorm, mille abil kriisijuhtimispädevusi tõsta ja enda riskipilti hinnata. • PäA juba tegeleb antud keskkonnas õppuste läbiviimisega, seega muutub see keskkond KOV-ide jaoks tuntud keskkonnaks. • PäA on avaldanud valmisolekut siduda KOV-i riskihindamise tööriistakast oma e-õppe keskkonnaga.	• Keskkonda on juba kokku koondatud palju KOV teenuseid puudutavat informatsiooni.	täna SITIKAS infosüsteemi kasutajad. • SITIKAS infosüsteem koondab juba täna teatud riskijuhtimiseks vajalikke andmeid.	kohandada vastavalt süsteemi tehnilistele vajadustele.
Miinused	• Keskkond on hetkel veel uus ja osadele tundmatu, mistõttu on vaja keskkonna tutvustamiseks läbi viia koolitusi. • PäA peab panustama platvormi uuendamisse, hooldustöödesse ja ülalpidamisse. • Vajab täiendavat arendust selleks, et oleks sobilik ka KOV-i riski- ja kriisijuhtimise tööriistakasti majutamiseks.	• Keskkond on avalik, sinna pääsevad ligi kõik. Seetõttu saab sinna üles laadida vaid seda infot, mis on avalik. • RaM esindajate hinnangul on vaja keskkonda muuta, kuna ta ei toimi nii nagu peaks. Süsteemi hooldamine, muutmine, täiendamine on nende sõnul keeruline, mistõttu pole süsteem väga haldaja-sõbralik. • Vajab täiendavat arendust selleks, et oleks sobilik ka KOV-i riski- ja kriisijuhtimise tööriistakasti majutamiseks.	• Keskkond on uus ja osadele tundmatu, mistõttu on vaja keskkonna tutvustamiseks läbi viia koolitusi. • SITIKAS infosüsteemi jookseb kokku palju informatsiooni (sh reaalajas), mistõttu võib riskide hindamiseks vajaliku informatsiooni välja filtreerimine olla raskendatud. • Vajab täiendavat arendust selleks, et oleks sobilik ka KOV-i riski- ja kriisijuhtimise tööriistakasti majutamiseks.	• Täiendava keskkonna loomine suurendab infomüra ja dubleerib osaliselt juba olemasolevaid süsteeme. • Uue platvormi arendus ja ülevalpidamine on eelduslikult kallim kui tööriista juba eksisteerivale platvormile integreerida.

Soovitus:

Stsenaarium 1 – meie arvates on kõige optimaalsemaks tööriista asukohaks PäA kriisijuhtimise õppekeskkond, sest riskide hindamise tööriistakast täidab loogiliselt ka seda funktsiooni, mis PäA õppekeskkonnal laiemalt on. Lisaks on ka PäA ise motiveeritud süsteemi omaniku rolli täitma.

3.2.8 Infovahetus kriisijuhtimisega seotud osapoolte vahel.

Eestis ei ole KOV üldjuhul aktiivselt kaasatud riski- ja kriisijuhtimise analüüsi dokumentide koostamisse. Ka riigiasutuste HOLP-id pole olnud avalikult KOV-i esindajatele kättesaadavad, mistõttu KOV-id sageli ei tea, milliseid ootuseid neile kriisijuhtimise osas on pandud ja nad ei näe oma rolli olulisust. Välisriikide praktikast nähtub, et üldjuhul toimub riikide siseselt tihe suhtlus ning riski- ja kriisijuhtimise dokumentide ja tulemite jagamine nii KOV-ide, regioonide, kui ka asutuste vahel. Juhul kui KOV-ide jaoks muutub riskide hindamine kohustuslikuks, vajab analüüsi ka see, kas ja kuidas tuleks riskianalüüside tulemusi jagada ka teiste osapooltega.

Table 10 Infovahetus kriisijuhtimisega seotud osapoolte vahel.

	Stsenaarium 1	Stsenaarium 2	Stsenaarium 3	Stsenaarium 4
Kirjeldus	**Ülevalt-alla kommunikatsioon:** Riigiasutused jagavad KOV-idele riskianalüüse ja HOLP-e, mis KOV-i puudutavad või milles oodatakse KOV-idelt mingite ülesannete täitmist.	**Alt ülesse kommunikatsioon:** KOV-id jagavad riigiasutustele oma riskide hindamise tulemusi ja kriisipaane.	**Horisontaalne kommunikatsioon**: KOV-id jagavad oma riskianalüüsi tulemeid ja muid kriisijuhtimise dokumente teiste KOV-idega.	**Ei tekitata dokumentatsiooni jagamise süsteemset lähenemist**, ehk olukord on nii nagu ta on ka praegu.
Plussid	• KOV-ide riskiteadlikkus kasvab kui neil on võimalus end asutuste riskianalüüside ja oma rolliga paremini kurssi viia. • KOV-id saavad kasutada riigiasutuste sisendit oma riskianalüüsis ja muuta oma analüüsid seeläbi sisukamaks. • KOV-idele tekib täpsem selgus ja arusaam selle kohta, mis on KOV-i roll ja ootus neile riskisündmuse juhtumisel.	• Tekib KOV-ide dokumentide kvaliteedikontrolli/ võrdluse koondamise ja üldistamise võimalus. • Asutused saavad kasutada KOV-ide dokumentide sisendit enda riskianalüüside ja HOLP-ide koostamisel. • Asutuste teadlikkus KOV-i tegelikest plaanidest kriisiolukorras paraneb ja asutused on paremini võimelised hindama KOV-ide tegelikku valmisolekut. • Juhul kui KOV-i sisend kandub edasi asutuste plaanidesse, siis KOV näeb, et tema loodud riskianalüüs ei ole vaid	• KOV-id saavad oma lähenemist võrrelda sarnaste või lähedal paiknevate KOV-idega. Samuti tekitab võrdlusmomenti ja võimalust õppida teiste kogemustest ja lähenemistest. • Võimaldab tugevdada ning täiendavalt sisustada regionaalse kriisikomisjoni rolli. • KOV näeb, et tema loodud riskianalüüs ei ole vaid endale loodud, vaid sellest on kasu ka teistele osapooltele (lisamotivatsioon).	• Ei teki ajakulu dokumentidega tutvumiseks. • Ei ole vaja platvormi/kanalit, kus dokumente jagada/üles laadida.

		endale loodud, vaid sellest on kasu ka teistele osapooltele (lisamotivatsioon).		
Miinused	• Tuleb luua kommunikatsiooni süsteem tuleb ja põhimõtetes kokku leppida. • Täiendav ajakulu dokumentidega tutvumiseks.	• Tuleb luua kommunikatsiooni süsteem ja põhimõtetes kokku leppida. • Võib tekkida tunne, et riskianalüüse tehakse kellegi teise tarbeks, mistõttu KOV-i motivatsioon võib ka langeda. • Täiendav ajakulu dokumentidega tutvumiseks. • Juhul kui KOV ei saa tagasisidet selle osas, kuidas tema sisendit kõrgematel tasanditel kasutatakse võib tegevus olla motivatsiooni pärssiv kohustuse täitmine.	• Tuleb luua kommunikatsiooni süsteem ja põhimõtetes kokku leppida. • Täiendav ajakulu dokumentidega tutvumiseks.	• KOV-idele ei teki võimalust enda plaane teistega võrrelda. • Asutused ja KOV-id ei ole kursis teineteise riskiplaanidega. • Praegune probleem, ehk teadmatus teiste plaanidest ja kuidas kedagi väljastpoolt kaasatud on, jääb lahendamata.

Soovitus:

Stsenaariumid 1, 2 ja 3 – riski- ja kriisiteadlikkuse tõstmiseks on vajalik, et kõik osapooled omavahel suhtleks ja vajalikku informatsiooni vahetaks. Lähtudes välispraktikast (Rootsi ja Iirimaa) saadud näidetele, soovitame luua kommunikatsioonisüsteemi, kus informatsioon ja osapoolte poolt loodud dokumendid liiguksid kõigi osapoolte vahel. See tagab kõige parema informeeritus, teadlikkuse, kaasatuse ning ühtlasi tekitaks ka süsteemisisese tugevama nõudluse ja motivatsiooni riskianalüüsi tulemite koostamiseks.

3.2.9 Kommunikatsioonikanal

Võttes arvesse eelmist soovitust sobiva infovahetuse süsteemi loomiseks on oluline määrata KOV-ide jaoks kõige efektiivsem kommunikatsioonikanal, kus omavahel ja asutustega kriisi-ja riskiteemalist informatsiooni jagada. Hetkel toimub info jagamine läbi mitmete erinevate kanalite (koosolekud, e-kirjad, asutuste dokumendihaldussüsteemid), mis on omakorda tekitanud olukorra, kus dubleerivat infot on palju, samas mõni tähtis infokild võib jääda tähelepanuta.

Table 11. Kommunikatsioonikanal

	Stsenaarium 1	Stsenaarium 2	Stsenaarium 3
Kirjeldus	**Jooksev kommunikatsioonikanal**: e-kirjad, meililistid, päringud jms.	**Ühtse kommunikatsioonikanali kasutamine**: ühised registrid, veebi-programmid, platvormid.	Kommunikatsioon peaks olema valdavalt kohtumiste põhine, toimuma **regionaalses kriisikomisjonis.**
Plussid	• E-kirjad ja meililistid loovad võimaluse kiirelt paljude inimestega ühenduse võtmiseks. • Operatiivsus, paindlikkus ja kiire tagasiside. • Tegu on nii KOV-ide kui ka asutuste esindajate jaoks igapäevase töövahendiga, mille kasutamine on lihtne.	• Võimalus kiirete päringutega saada automaatselt ligipääs soovitud andmetele, informatsioonile. Kui informatsiooni ei eksisteeri ja tuleb teha päring, siis see saab ka olla ühekordne sisestamine. • Päringute ja olemasolevate mustrite põhjal täiendavat lahendamist vajavate kitsaskohtade tuvastamise võimalus.	• Kommunikatsiooni kanal, mida täna aktiivselt kasutatakse. • Võimalus vahetuks aruteluks ja täpsustavate küsimuste küsimiseks (juhul kui selleks aega on).
Miinused	• Infomüra tõttu võib osa infost jääda kahe silma vahele. Palju “prügi”, kui meililistides käsitletakse vaid osade liikmete jaoks olulist infot. • Informatsioon aegub ja vajab regulaarset uuendamist, mis staatilise kommunikatsiooni puhul on ebaefektiivne. • Infovahetuse välditav administratiivne koormus sarnast infot vajavate päringute puhul.	• Kommunikatsioonikanal, mida KOV-id ja asutused ühiselt kasutada saaksid, vajab arendust ja põhimõtetes kokku leppimist. • Platvorm vajab regulaarset hooldust, andmete uuendamist ja parendamist. • Liigne keerukus ja info paljusus võib vähendada kasutajamugavust.	• Kõik KOV-ide esindajad ei pruugi komisjonis aktiivselt ja regulaarselt osaleda, mistõttu jäävad infovoost kõrvale. • Väljaspool kriisiaega kohtub regionaalne kriisikomisjon vaid 4 korda aastas, mistõttu põhjalikuks plaanide ja analüüside tutvustamiseks ei ole aega. • Informatsiooni kogus, mida sellises suulises formaadis suudetakse vastu võtta ja meeles pidada on piiratud.

Soovitus:

Stsenaarium 1, 2 ja 3 – meie hinnangul oleks optimaalne, kui paljusid osapooli puudutav riskianalüüsi info (näiteks KOV-ide riskianalüüsi tulemid) oleks metoodika platvormi sees kõigile asjakohastele asutustele kättesaadavaks tehtud. Kindlasti peaks säilima ka kohtumiste/arutelude formaat regionaalses kriisikomisjonis. Muu riski ja kriisialase infovahetuse osas on soovitatav panustada kontaktvõrgustiku arendamistesse ning seejärel luua erinevad meililistid eri alagruppide lõikes (nt regionaalsed grupid, riski/valdkonna põhised grupid jms).

3.2.10 Ligipääsuõigused

Asutuste riskianalüüsid on Eestis täna vaid asutusesiseseks kasutamiseks. KOV täna riskianalüüse ei koosta, kuid varasemalt koostatud analüüsid olid avalikud. Ka rahvusvahelise praktika puhul leidub mitmekülgset lähenemist – lirimaal on KOV riskianalüüsid üldjuhul avalikud, Rootsis aga salastatud. Seetõttu tekib küsimus ka selle osas, kuidas Eestis peaks edaspidi KOV-de riskianalüüse käsitlema. Avalikustamise tase määrab muu hulgas ka selle, kuhu platvormile saab metoodika tööriista paigutada.

Table 12. Väljunditele ligipääsetavus

	Stsenaarium 1	Stsenaarium 2	Stsenaarium 3
Kirjeldus	KOV-ide riskianalüüsid peaksid olema **ainult asutusesiseseks kasutamiseks**.	KOV-ide riskianalüüsid peaksid olema **avalikud.**	Riskianalüüside ligipääsuõiguste piiramine peaks toimuma **kaasuspõhiselt** vastavalt riskide ja info olemusele.
Plussid	• Riskide ja lahendusplaanide avalikustamine võib kodanikes tekitada asjatut hirmu ja paanikat, plaanide salastamisega saab sellest hoiduda.	• Valimiste järgselt on teadmuse edasiandmine kiirem, kuna dokumentatsiooniga on võimalik tutvuda juba eelnevalt. • Riskijuhtimist ja kriisivalmisolekut puudutav teadmus on KOV-i inimeste seas laiemat kättesaadav. • Parem läbipaistvus – KOV-i elanikud saavad nõuda KOV-i juhtidelt rohkem tegutsemist (juhul kui nad tunnevad, et hetkel ei tehta piisavalt). • Luuakse dokumentidega tutvumise võimalus ka teistele KOV-idele ja asutustele. • Riskijuhtimise informatsiooni jagamine on OECD soovitus, sest see aitab suurendab analüüside kvaliteeti, sest neid saavad küsimuse alla seada akadeemikud ja	• Riskide ja lahendusplaanide avalikustamine võib kodanikes tekitada asjatut hirmu ja paanikat. Tundlike plaanide salastamisega hoidutakse liigsest paanikast. • Dokumentide sisu näevad vaid need osapooled, kellele see on vajalik. • Luuakse dokumentidega tutvumise võimalus ka teistele KOV-idele ja asutustele. • KOV-i elanikud saavad nõuda KOV-i juhtidelt rohkem tegutsemist (juhul kui nad tunnevad, et hetkel ei tehta piisavalt). • Riskijuhtimise informatsiooni jagamine on OECD soovitus, sest see aitab suurendab analüüside kvaliteeti, sest neid saavad küsimuse alla seada akadeemikud ja teadlased. Seeläbi saavad riskianalüüsid täiendavaid soovitusi ja parendusi.

		teadlased. Seeläbi saavad riskianalüüsid täiendavaid soovitusi ja parendusi.	
Miinused	• Tuleb seada kindlad piirangud, kellele on KOV-i siseselt ligipääs tagatud, see võib erineda KOV-iti. Kuivõrd inimeste positsioonid ja rollid muutuvad, siis tuleb ligipääsuõigusi regulaarselt uuendada. • Piiratud ligipääs raskendab teadmuse ja oskuste edasi kandumist KOV-i siseselt (valimiste järgselt või võimuliidu vahetumise korral). • Piiratud kommunikatsioon riski- ja kriisijuhtimist puudutava info osas teiste KOV-ide ja asutustega.	• Riskide ja lahendusplaanide avalikustamine võib kodanikes tekitada asjatut hirmu ja paanikat. • Teoreetiliselt on võimalik infot ka halvasti ära kasutada – seda näiteks juhul kui KOV on enda kõige haavatavamad kohad ja suurimad nõrkused/puudused välja toonud.	• Ligipääsupiirangute liigitamine võib osutuda keeruliseks. Lisaks tuleb seada kindlad piirangud, kellel on millistele dokumentidele ligipääs. Kuivõrd inimeste positsioonid ja rollid muutuvad, siis tuleb ligipääsuõigusi regulaarselt uuendada. • On ka võimalus, et mõni KOV avaldab kogemata sellist infot, mida ta ei oleks pidanud avaldama.

Soovitus:

Stsenaarium 3 – meie hinnangul on asjakohane enamike dokumentide avaldamine, kuid jätta võimalus piirata kriitilise või tundliku informatsiooni avaldamist vajaduspõhiselt. See alternatiiv tagab meie hinnangul parima tasakaalu läbipaistvuse ja potentsiaalselt tundliku informatsiooni väärkasutamise riski vahel. KOV-ide hinnangul võiks riskipilt ja muu avalikul informatsioonil tuginev olla avalik, kuid lahenduskäigud ja plaanid peaksid siiski jääma asutusesiseseks kasutamiseks, et vältida paanika tekkimist ja info pahatahtlikku ärakasutamist.

3.3 Stakeholder impacts of local municipalities' risk and crisis management toolbox

Table 13. Stakeholder impacts

	Local municipalities	The Government Office	Responsible agencies	Ministries and other agencies	The Rescue Board
Organization	It is advised that the municipalities assign a (part-time) person who is responsible for the risk and crisis management; however, the toolbox must be used cooperatively within the municipality. All relevant stakeholders (key service providers, various municipality employees) should be involved in the risk and preparedness assessments.	The GO may need additional personnel for supporting the implementation of the municipality toolbox, at minimum in the implementation phase.	Responsible agencies need to pay heightened attention to their risk data management and communication with the municipalities. Therefore, there may be a need to reallocate the roles and personnel resources.	N/A	The RB will need a dedicated person who will provide the municipalities with guidance and support while using the toolbox. The RB should also assign a person responsible for the upkeep of the technical environment.
Culture	The toolbox should increase the risk awareness in municipalities. Consequently, it could impact how resilience is valued by the municipalities and its employees and partners. The methodological approach propagates cooperation and	N/A	N/A	N/A	N/A

	transparency in information relating to crisis management, these approaches may pass on to other processes. The toolbox encourages municipalities to share their results with other municipalities, which could result in more cooperation and risk awareness.				
Process	The municipalities will be required to regularly carry out and update their risk assessment. The local municipalities will start using the toolbox to improve their crisis preparedness.	GO needs to make sure the legislative changes are made (or new societal norm is accepted) to support the implementation of the toolbox. These changes include making risk assessments mandatory for the municipalities and making it mandatory for the responsible agencies and ministries to support and inform the municipalities as needed. The GO should also coordinate and support the sharing of risk related information to municipalities.	The responsible agencies need to better communicate their risk assessments and role expectations to municipalities. The responsible agencies need to systematically collect and manage risk-related data. The responsible agencies need to share the relevant risk data with local municipalities.	Other agencies and ministries need to establish ways how to communicate their role expectations to municipalities. The ministries and agencies need to systematically collect, manage, and share the relevant data concerning local municipalities and municipality services.	The RB needs to provide trainings and guidance to local municipalities in performing the risk assessments and using the toolbox. The RB should promote the use of the toolbox and methodologies across municipalities. The RB should provide quality review and feedback for the municipalities. The RB should facilitate sharing the results of risk assessments in Regional Crisis Committees.

Technical	The municipalities will have a new platform for their crisis management related activities. It reduces the need to develop independent systems in different municipalities.	N/A	The responsible agencies need to make information (role expectations, risk related data) available via the new technical solution. This may need some system integrations.	N/A	The toolbox should be integrated into the RB's platform. RB will be responsible for updating and upkeeping the platform and the toolbox functionalities.

3.4 Critical uncertainties concerning the implementation of local municipalities' risk and crisis management toolbox

There are some uncertainties in the Estonian risk and crisis management policy and system set-up which may impact the successful implementation of the municipalities risk and crisis management toolbox. Table 14 gives an overview of the main uncertainties which may hinder the ability to accomplish the goals of the toolbox.

Table 14. Uncertainties for the risk and crisis management toolbox

Critical uncertainties	Potential negative impact caused by the uncertainty
Obligatoriness of risk assessment for local municipalities	Under the current regulatory set-up, municipalities have been able to put limited focus on risk and crisis management activities and justify it by saying that this is not something they are explicitly required to do. Therefore, risk and crisis management are in many municipalities seen as a low priority task. Consequently, the risk awareness amongst the municipalities is low and investments into resilience building and preparedness will not get funding. Our recommendation would be to make the risk assessment mandatory for all municipalities (in accordance with their capabilities and risk environment). The future Preparedness Law in its current state, however, does not explicitly make risk assessment compulsory activity. There may be implicit requirements for undertaking risk assessment (e.g., capability assessment is required under the new law, and we could implicitly justify that without undertaking the risk assessment, the capability assessment cannot be performed). However, if such implicit requirements are not enforced in action (or the risk assessment made explicitly compulsory), it is unlikely that all municipalities will start to carry out the assessments. As such, the goal of increased risk awareness will only be partially met.

Insufficient funding for risk management activities	Even if the municipality does carry out the risk assessment and uses all of the components of the created methodology, this in itself will not improve their preparedness. Many improvements for resilience and preparations need additional monetary (or time) resources. Municipalities have numerous obligatory tasks which they must carry out by using their own budget. Risk management activities are low priority items because their positive impact is not widely visible with immediate payback. Therefore, municipality governments may still prefer using the funds (or personnel time) for other policy areas. We believe that municipalities should be additionally motivated via the provision of some extra resources for risk and crisis management activities and investments.
Resource availability for the development of the technical environment	The same budgetary restriction may also limit the opportunities for developing the actual technical system for the municipalities. In principle, the methodology we have developed is not dependent on the technical system, however, it makes it easier for the municipalities to use the environment. Using the methodology in MS Excel without any automated links between modules or databases makes the process more difficult and time-consuming for the municipalities. This would hinder the spread of usage of the methodology among local municipalities.
Municipalities need continuous support to meaningfully carry out their risk and crisis management activities	The Preparedness Law will require all municipalities to set out a crisis management plan and map their capabilities as a part of that. This is a new task for most municipalities (only 33 of 79 have been vital service coordinators for at least one service and therefore been required to have a crisis management plan before). Given the current active role of the RB in various risk and crisis management activities, local municipalities will turn to RB for assistance and help. It is unlikely that the RB will manage to meet the new demand for guidance and support. The GO should make sure that the RB has adequate resources and personnel to support the municipalities or support municipalities in acquiring guidance and support from the private sector. It is currently unclear if such resources can be made available.
Quality review and feedback structures need to be implemented	It is important that the risk assessments and crisis management plans created by municipalities are created as a result of meaningful thought process and proper engagement of relevant individuals and stakeholders. Therefore, some form of quality review and feedback structures are needed. It is unclear if the RB will have enough time and resources to review 79 crisis management plans (almost 3 times more than currently, reaching significantly more in depth than previously). If there is no meaningful quality review or feedback processes in place, the risk assessments and crisis management plans may turn into “tick in a box” exercises for some municipalities and therefore do not create better preparedness among those municipalities.

Risk related data is not systematically available for municipalities	Information related to risk events and crisis management is not currently centrally collected and managed. Often ministries and agencies are not communicating the risk related information they have to municipalities. There are no processes in place to guide this communication. If there is no structured cross-sectoral initiative to map the risk related data available in different agencies and ministries, the use of data cannot become more prevalent in municipalities' risk and crisis management activities.

3.5 Implementation scenarios for the disaster loss methodology (in Estonian)

3.5.1 Kriisikahjude hindamise eesmärk ja väljundid

Kuna täna Eesti aktiivselt kriisikahjude hindamist ei tehta, siis on ka tegevuste eesmärk ja sellest lähtuvalt väljundite vorm ja sisu lahtine. Seniste kriisikahjude hindamise eesmärk on olnud asutusesisese eelarve pidamine ja piiratud mahus erinevate sündmuste otseste kahjude arvestuse pidamine. Aruteludest turuosalistega on esile kerkinud soov kasutada kriisikahjude arvestust ka planeerimise ja valmistumise tööriistana, mis aitaks põhjendada ettevalmistuste ja ennetuse vajalikkust.

Table 15. Kriisikahjude hindamise metoodika väljundite kasutusala

	Stsenaarium 1	Stsenaarium 2
Kirjeldus	Metoodika eesmärk on anda asutustele **parem ülevaade** kriisistsenaariumite võimalikest tagajärgedest ja kaasnevate kulutuste ulatusest, kuid täiendavaid kohustusi kahjude hindamise järgselt asutustele ei tule.	Kriisikahjude hindamise eesmärk oleks panna paika **riskianalüüsi jätkutegevused**, sh maandamismeetmed, võimekuste ja vastupidavuse tõstmine. Metoodika peab looma võimaluse hinnata kulusid tänase võimekuse, aga ka muutuva võimekuse puhul (nii täiendavata haavatavuste tekkimise korral kui ka võimekuste tõstmise järgselt). Seeläbi peaks asutused või Riigikantselei võimelised valima välja kõige kuluefektiivsemad kriisivalmisolekut tõstvad meetmed ning metoodika väljundid peaks olema selle otsustusprotsessi lahutamatu osa.
Plussid	• Võimaldab paindlikku ja vajaduspõhist lähenemist, asutus saab ise hinnata, millises ulatuses ja kus kriisikahjude tulemit kasutatakse.	• Lähenemine muudab kriisikahjude hindamise protsessi eesmärgipäraseks ja motiveerib turuosalisi panustama, selle tulemusel tõuseb riiklik kriisideks valmisolek. • Metoodika võimaldaks vähemalt teoreetiliselt erinevaid kriise omavahel võrrelda. Kui tekib võrdlusvõimalus, siis tekib võimalus ka optimaalsemalt investeerida ettevalmistusse ning suunata rahastust prioriteetsematesse valdkondadesse.
Miinused	• Juhul kui analüüs ei tekita täiendavaid tegevusi, võib asutustes tekkida küsimus, miks kahjude analüüs üldse vajalik on. Seetõttu võivad asutused aja kokkuhoiu nimel analüüsi läbiviimisest hoiduda. See aga takistab tsentraalse tervikpildi tekkimist, sest analüüsi viivad läbi vaid üksikud entusiastid.	• Vajab regulaarselt ekspertide pühendumist ja sisulist tööd kahjude hindamisega erinevates valdkondades. • Nõuab vastutavatelt asutustelt oluliselt suuremat pingutust ja ajalist investeeringut.

Soovitus:

Stsenaarium 2 – meie hinnangul tekib kriisikahjude hindamis metoodikast kõige suurem väärtus siis, kui hindamise tulemusi kasutatakse sobivate maandamismeetmete disaini juures. Juhul kui tulemus on lihtsalt teadmiseks võtmiseks, ei ole tegu eelduslikult efektiivse aja ja ressursikasutusega. Meie hinnangul peaks kriisikahjude hindamine muutuma üheks oluliseks tööriistaks, mille abil hinnatakse riiklike kriisiennetuse investeeringute prioriseerimist ning riskimaandamise meetmete rakendamist. Kriisikahjude prognoosimise eelduseks on aga kriisikahjude kaardistamine toimunud sündmuste kohta.

3.5.2 Kriisikahjude hindamise lähenemine

Kuivõrd täna kriisikahjude hindamist Eestis süstemaatiliselt ei toimu, on valik ka selles, millises formaadis kriisikahjude hindamist ellu viima peaks. Peamine erinevus alternatiivide vahel seisneb selles, kas kriisikahjud on tööriist individuaalsetele asutustele, kes riskianalüüse koostavad ja soovivad läheneda kriisi tagajärgede hindamisele süsteemsemalt ja andmepõhisemalt, või on tegu protsessiga, mida tuleks läbi viia tsentraalselt ja asutuste üleselt. Kui läheneda kriisikahjude hindamisele valdkondade üleselt, on tarvis otsustada, kuidas valdkondade ülesus tagatakse – kas asutuste eraldiseisvalt koostatud sisend koondatakse kokku üheks suureks kriisikahjude mõjuhinnanguks, või peaks juba mõjude hindamine ise toimuma ühise koosloome protsessina.

Table 16. Kriisikahjude hindamise läbiviimine

	Stsenaarium 1	Stsenaarium 2	Stsenaarium 3	Stsenaarium 4
Kirjeldus	**Asutused peaks kahjusid hindama ühiselt.** See lähenemine eeldab valdkondade üleste eksperttöögruppide loomist. Töögruppide ülesandeks on analüüsida erinevate riskistsenaariumite realiseerumise valdkondlikku mõju. Töögrupp saab koostada ühise tsentraalse kriisikahjude mõju ülevaate, mis sisaldab nii kriisi kahjusid nii vastutava asutuse, muude riigiasutuste, KOV-i vaatest ja sisaldab ühiskondlikku mõju kõigis sektorites. Ekspertide töögrupp saab tugineda nii asutuste kasutuses olevatele andmetele kui ka ekspertide hinnangutele ja kogemustele. Seda mudelit kasutatakse kriiside mõju hindamiseks näiteks Iirimaa süsteemis.	**Kahjude hindamine toimub asutuse siseselt.** Iga asutus (või ministeerium või KOV) hindab ise oma riskistsenaariumite tagajärgi ja kaasnevaid kahjusid. Asutus, kes kriisikahjusid analüüsib, tugineb endale kättesaadavatele andmetele ja oma ekspertteadmisele. Vajadusel võib asutus küsida tuge ja sisendit ka teisestest asutustest, asutus on nö proaktiivne juhtorgan laiema mõju hindamiseks vajalike sisendite saamisel teistest asutustest.	**Kriisikahjude hindamist koordineerib Riigikantselei.** Riigikantselei koordineerib riikliku riskiraporti koostamist. Riskianalüüsi läbiviimisel tuginetakse vastutavate asutuste sisendile ning vajadusel kutsutakse kokku laiapõhjalised ekspertgrupid.	**Kriisikahjude hindamisega tegeleb üks asutus.** Kriisikahjude hindamise ülesanne määratakse ühele asutusele ja vastutavale meeskonnale (nt Riigikantselei, RaM, PäA, vm). Meeskonna ülesanne oleks koondada andmed valdkondade üleselt, analüüsida ja koostada riigiülene tervikvaade, mida saaks kommunikeerida teistele tasemetele (sh ministeeriumitele, vastutavatele asutustele ja KOV-dele).

Plussid	• Töögrupp võimaldab regulaarselt kahjude hindamiseks kokku tuua kõikide mõjutatud valdkondade esindajad ja ekspertteadmise. • Võimalus, et mõne valdkonna esindajad hoiduvad sisendi andmisest või riski mõju hindamisest omas valdkonnas on väike. • Kõikides relevantsetes valdkondades teadvustatakse riskistsenaariumi olulisust ja võimalikke tagajärgi, mis toob kaasa valdkonnaülese riskiteadlikkuse tõusu. • Kõrgem teadlikkus muudab tõenäolisemaks, et riskisündmuseks valmistumisega tegeletakse erinevates valdkondades ja rakendatakse maandamismeetmeid või valmistutakse kriisi tagajärgedega tegelemiseks.	• Asutus, kes analüüsi läbi viib, on koordinaatori rollis ja tunneb selget vastutust tulemuse kvaliteedi eest. • Asutus saab oma valdkonnas kõige paremini määrata, millisele infole ta analüüsis tugineda soovib ja vajadusel vajalikke andmeid juurde koguda.	• Riigikantselei on positsioonis, kus tal on suurem mandaat koondamaks valdkondade ülest informatsiooni nii vastutavatelt asutustelt kui ka ministeeriumitelt. Seeläbi on võimalik saada terviklikum pilt riskistsenaariumitega kaasnevast potentsiaalsest kahjust. • Riigikantseleis on kriisijuhtimise kõige kõrgem tase, mis tähendab, et Riigikantseleil on mandaat anda suuniseid ettevalmistuste ja maandamismeetmete vajalikkuse ja riiklike prioriteetide seadmise osas. • Riigikantselei tagaks kriisikahjude koordinaatori rolli olemasolu ja määraks Riigikantseleile ka selge vastutuse kriisikahjude hindamise tegevuste elluviimiseks.	• Kriisikahjude hindamise eest vastutava asutuse määramine tagab selge vastutuse hindamise läbiviimise eest. • Kui kriisikahjusid hinnatakse tsentraalselt siis on kindel, et kõigis valdkondades kasutatakse ühesugust lähenemist. • Ühe tsentraalse meeskonna kaasamine tagab vajalike kompetentside olemasolu ja seeläbi analüüsi kvaliteedi.
Miinused	• Suur halduskoormus kõikidele kaasatavatele osapooltele.	• Kriisikahjude hindamine nö silotorni keskselt, lähtudes oma asutuse huvidest ja teadmisest ja võttes	• Täiendav halduskoormus Riigikantseleile.	• Kriisikahjude hindamine vajab erinevaid kompetentse. Ühelt poolt on vajalikud teadmised kriisisündmuste trendidest, tagajärgedest jms, kuid teiselt poolt

	• Selge vastutuse puudumine, kuna tegu on ühise ettevõtmise ja jagatud vastutusega.	peamiselt arvesse enda valdkonnale tekkivat kahju. • Keeruline saada ligipääsu andmetele, mis võimaldaks hinnata ka riskistsenaariumi laiemat ühiskondlikku mõju. • Kriisikahjude hindamine vajab erinevaid kompetentse. Ühelt poolt on vajalikud teadmised kriisisündmuste trendidest, tagajärgedest jms, kuid teiselt poolt on vajalikud ka laialdase majandus- ja finantsteadmised, mis aitavad mõista kahjude ulatust nii lühemas kui ka pikemas perspektiivis. Kõikides relevantsetes asutustes, kes kriisikahjude hindamisest kasu saaksid, ei pruugi eksisteerida vajalikke teadmisi.	on vajalikud ka laialdase majandus- ja finantsteadmised, mis aitavad mõista kahjude ulatust nii lühemas kui ka pikemas perspektiivis. Ühel tsentraalsel meeskonnal ei pruugi olla piisavalt valdkondade spetsiifilisi teadmisi. • Tsentraalne lähenemine soodustab tunnelinägemust.

Soovitus:

Stsenaarium 3 – kuivõrd kriisikahjude terviklik hindamine vajab tsentraalset valdkondade ülest vaadet (nö valdkonnaülene ühiskondlik kahju), ei soovita me kriisikahjusid hinnata vaid ühe asutuse keskselt (kuigi sellel võib olla kasusid ka spetsiifilisele analüüsi läbi viivale asutusele oma meetmete planeerimisel). Terviklik kriisikahjude hindamine peab koondama andmeid ja sisendit kõigist sektoritest ja valdkondadest, mida kriis puudutab. Tuginedes turuosaliste senisele praktikale, kus vastutavad asutused on lähtutud teiste asutuste jooksvast kaasamisest riskihinnangute läbiviimisel, ei ole senine lähenemine taganud asutuste piisavat koostööd ja kaasumist. Motivatsioon sisukalt kaasa mõelda on olnud madal. Seetõttu soovitame võtta õppust Iirimaa lähenemisest, kus kriisikahjude/tagajärgede hindamist viiakse läbi tuginedes valdkondade üleste ekspertgruppide sisendile ja kogemusele. Kuna valdkondliku teadmuse kokku toomine vajab mandaati, siis meile tundub, et see funktsioon sobitub kõige paremini Riigikantselei kui riikliku riskiraporti koostamise koordinaatori ülesannetega. Seetõttu soovitame me kriisikahjude hindamise eeltöö teha vastutavatel asutustel, kuid kahjude hindamise tulemi formuleerimine koos kõigi valdkondade esindatusega ekspertgruppides jääks Riigikantselei ülesandeks.

3.5.3 Kasutajad

Kuivõrd täna Eesti kriisijuhtimise valdkonnas kriisikahjude hindamisega süstemaatiliselt ei tegeleta, siis pole ka selge, kelle ülesandeks kriisikahjude hindamine edaspidi jääma peaks. Lähenemisviise kriisikahjude hindamisele on erinevaid. Võib läheneda tsentraalselt, koondades kokku kriisikahjud riigiüleselt (kas siis vastutavate asutuste kaupa või Riigikantselei poolt tsentraalselt arvutatuna). Teisalt on aga võimalik kriisikahjusid analüüsida regionaalselt või KOV-i tasandil.

Table 17. Kriisikahjude hindamise metoodika kasutajad

	Stsenaarium 1	Stsenaarium 2	Stsenaarium 3	Stsenaarium 4
Kirjeldus	Hädaolukordade eest **vastutavad asutused** peaksid hindama kriisikahjusid oma vastutusalasse kuuluvate riskistsenaariumite osas.	Kriisikahjude hindamisega peaksid tegelema **ministeeriumid.** Ministeeriumid peaksid hindama kriisikahjusid terve oma valitsemisala ulatuses.	**KOV-id** peaksid hindama kriisikahjusid oma piirkonnas aset leidvate riskistsenaariumite osas.	**Riigikantselei** peaks ise hindama kriisikahjusid riikliku riskiraporti koostamise juures.

Plussid	• Kriisikahjude hindamine võimaldab kvantifitseerida kriisisündmuste mõju. Kuivõrd vastutavad asutused koostavad riskianalüüse oma valdkonna riskidele, siis kriisikahjude hindamine muudaks nende riskianalüüsid sisukamaks. • Kriisikahjude metoodika võtab arvesse ka asutuste võimekust kriisisündmustele reageerida ja aitab kvantifitseerida ennetustegevuste ja ettevalmistuste mõju kriisi tagajärgede vähendamisele. See aitab põhjendada ettevalmistuse ja ennetuse olulisust ja motiveerida asutuste investeeringuid ja valmisoleku tõstmist.	• Võimaldab ministeeriumitel hinnata kuidas erinevad kriisisündmused avaldavad mõju nende valdkonnale. • Võimaldab kaasata ministeeriumite valitsemisalas kogutud andmeid.	• Kriisikahjude hindamine võimaldab kvantifitseerida kriisisündmuste mõju. Kui KOV-idele muutuvad riskianalüüsid kohustuslikuks, siis kriisikahjude hindamine muudaks nende riskianalüüsid sisukamaks. • Kriisikahjude metoodika võtab arvesse ka võimekust kriisisündmustele reageerida ja aitab kvantifitseerida ennetustegevuste ja ettevalmistuste mõju kriisi tagajärgede vähendamisele. See aitab põhjendada ettevalmistuse ja ennetuse olulisust ja motiveerida asutuste investeeringuid ja valmisoleku tõstmist.	• Kriisikahjude hindamine võimaldab kvantifitseerida kriisisündmuste mõju. Riikliku riskiraportitesse ka kriiskahjude perspektiivi kaasates muudaks see riskianalüüsid sisukamaks. • Kriisikahjude metoodika võtab arvesse ka võimekust kriisisündmustele reageerida ja aitab kvantifitseerida ennetustegevuste ja ettevalmistuste mõju kriisi tagajärgede vähendamisele. See aitab põhjendada ettevalmistuse ja ennetuse olulisust ja motiveerida asutuste investeeringuid ja valmisoleku tõstmist. Kuivõrd Riigikantselei seab riiklike kriisijuhtimise prioriteete on ta sobiv organisatsioon ennetuse ja ettevalmistuse suunamiseks riiklikul tasandil. • Riigikantseleil on oma positsioonist lihtsam koguda informatsiooni mõjude kohta nii vastutavatest asutustest kui ka erinevatest ministeeriumitest, mis on valdkondade üleste kriiside mõjude hindamise oluline eeldus.

Miinused	• Vastutavad asutused (eriti need, kelle vastutusalas on palju kriisisündmusi ja -stsenaariume) tunnevad, et tänane riskianalüüside koormus võib olla kohati juba täna üle võimekuste piiri. Seetõttu ei pruugi vastutavatel asutustel olla ressurssi täiendavate kohustuste täitmiseks. • Kriisikahjude hindamine vajab valdkondade ülest vaadet, kuid vastutaval asutusel on vaid see info, mis tuleneb otseselt akuutse kriisi lahendamisest tema vastutusala piires. • Kriisikahjude hindamine vajab erinevaid kompetentse. Ühelt poolt on vajalikud teadmised kriisisündmuste trendidest, tagajärgedest jms, kuid teiselt poolt on vajalikud ka laialdase majandus- ja finantsteadmised, mis aitavad mõista kahjude ulatust nii lühemas kui ka pikemas perspektiivis Kõiki vajalikke kompetentse ei pruugi kõigis vastutavates asutustes olla.	• Paljud kriisisündmused mõjutavad otsesel või kaudsel moel ministeeriumite valitsemisalasid, mistõttu on halduskoormus ministeeriumitele kriisikahjude hindamise juures märkimisväärne. • Kriisikahjude hindamine vajab erinevaid kompetentse. Ühelt poolt on vajalikud teadmised kriisisündmuste trendidest, tagajärgedest jms, kuid teiselt poolt on vajalikud ka laialdase majandus- ja finantsteadmised, mis aitavad mõista kahjude ulatust nii lühemas kui ka pikemas perspektiivis. Kõiki vajalikke kompetentse ei pruugi kõigis ministeeriumites olla.	• KOV-i kriisijuhtimise alane pädevus on kõikuv ja võimalus kriisikahjude hindamisse aega panustada on piiratud. • Kriisikahjude hindamine vajab erinevaid kompetentse. Ühelt poolt on vajalikud teadmised kriisisündmuste trendidest, tagajärgedest jms, kuid teiselt poolt on vajalikud ka laialdase majandus- ja finantsteadmised, mis aitavad mõista kahjude ulatust nii lühemas kui ka pikemas perspektiivis. Kõiki vajalikke kompetentse ei pruugi KOV-idel olla • Kuna kriisikahjude süsteemse hindamisega ei ole Eestis seni praktiliselt tegeletud, on kriisikahjude hindamine KOV-ide jaoks hetkel liiga keeruline ülesanne.	• Riigikantselei riskide ja kriiside koordinatsiooniga tegelev meeskond ei pruugi olla piisav, et suuta koordineerida üle kõigi valdkondade kriisikahjude hindamist. • Kriisikahjude hindamine vajab erinevaid kompetentse. Ühelt poolt on vajalikud teadmised kriisisündmuste trendidest, tagajärgedest jms, kuid teiselt poolt on vajalikud ka laialdase majandus- ja finantsteadmised, mis aitavad mõista kahjude ulatust nii lühemas kui ka pikemas perspektiivis. Antud momendil ei pruugi olemas olla kõik vajalikud kompetentsid

Soovitus:

Stsenaarium 1, 2 ja 4 – Kriisikahjude hindamisest on kasu kõikidele osapooltele, kuid KOV-ide puhul jääb täna puudu vajalikest ressurssidest (aeg, inimesed ja teadmised), seetõttu ei ole mõistlik oodata KOV-idelt kriisikahjude hindamist. Võimekamad KOV-id võivad seda soovi korral teha ja kasutada tulemit oma riskianalüüside täiendava sisendina. **Kõige suurem roll kriisikahjude hindamisel peaks lasuma Riigikantseleil, kes koostab riikliku riskiraportit**. Meie arvates on loogiline, et riikliku riskiraporti koostamisel tugineb Riigikantselei vastutavatele asutustele ja ministeeriumitele, kes oma vastutusala riskidele seda hindamist ise koordineerivad, kuid kuna kriisikahjude mõjud on laiemad kui on asutuste võimekuses hinnata, siis on oluline, et Riigikantselei kaasaks kahjude hindamisse ekspert teadmisi laiemalt. Asutused võivad kriisikahjusid hinnata ja seeläbi oma riskianalüüse andmepõhisemaks ning sisukamaks muuta, kuid see puudutab peamiselt intsidente, mille puhul on nemad peamiseks andmete kogujaks ja mis ei vaja laialdast sektorite ülest kriisikahjude hindamist. Teisalt on vastutavate asutuste ligipääs valdkondade ülesele informatsioonile piiratud, mistõttu on Riigikantseleil meie hinnangul oluline roll kriisikahusid puudutava informatsiooni kogumise toetamisel ja kahjude hindamisel riigiriskiraporti koostamise käigus. Juhul kui ühe ministeeriumi valitsemisalas on mitmeid vastutavaid asutusi ja laiemaid valdkondi, siis võiksid ministeeriumid valdkondade üleselt info kokku koondada ja seda Riigikantseleiga jagada.

3.5.4 Kohustuslikkus

Hetkel puudub kriisikahjude hindamise otsene kohustus. Osades asutustes viiakse läbi kriisikahjude hindamist, kuid see praktika keskendub peamiselt akuutse kriisi lahendamisele kuluvate materiaalsetele ressurssidele – näiteks lisatööjõule kulunud töötunnid või kasutusele võetud lisatehnika. Sellist kriisikahjude hindamist viiakse läbi riskisündmuse ajal või tagantjärele. Hindamist ei tehta prognoosivalt ja potentsiaalsete sündmuste osas. Erandiks on Euroopa Üleujutuste Direktiivist tulenev kohustus, mille tõttu KeM üleujutusriski ka kriisikahjude perspektiivist hindab. Juhul kui võtta kasutusele ühine kriisikahjude hindamise tööriist, tuleks ka teha otsus, kas teha selle kasutamine kõikidele osapooltele kohustuslikuks või jätta vabatahtlikuks.

Table 18. Kriisikahjude metoodika kohustuslikkus

	Stsenaarium 1	Stsenaarium 2
Kirjeldus	Kriisikahjude hindamine peaks olema **kohustuslik** (nt riikliku riskiraporti koosseisus).	Kriisikahjude hindamine peaks olema **vabatahtlik** nii asutustele kui ka Riigikantseleile.
Plussid	• Tekib süsteemne kahjude hindamise ja informatsiooni kogumise süsteem, kuhu panustavad kõik relevantsed osapooled. • Võimaldab mõista laiemalt riskistsenaariumide,haavatavuse ja võimekuse seoseid tagajärgedega.	• Võimaldab asutusel ise hinnata, kas kriisikahjude hindamine on vajalik ja asutuse jaoks väärtust loov tegevus.

	• Võimaldab õppida teiste asutuste hindamistest. • Suunab asutusi mõtlema süsteemselt tagajärgedele, ennetusele ja ettevalmistustele.	
Miinused	• Halduskoormuse suurenemine	• Kuna kriisikahjude hindamine on süsteemne tegevus, mis eeldab paljude osapoolte sisendit ja panust, siis ei ole piisav, et üksikud vabatahtlikud osapooled panustavad, sest see vähendab terviklikult kriisikahjude hindamise efektiivsust. • Ilma kahjude hindamiseta on keeruline põhjendada ettevalmistuste või maandamismeetmete vajalikkus, mistõttu kriisiennetus jääb päevapoliitika taustal tagaplaanile.

Soovitus:

Stsenaarium 1 – kuna kriisikahjude hindamine parendab riskihindamise kvaliteeti ja eeldab paljude osapoolte ühist pingutust, soovitame kriisikahjude hindamise muuta kohustuslikuks riigiriskiraporti koostamise raames. HOLP-ide uuendamisel on võimalik kasutada viimase riigiriskiraporti ajal tehtud kriisikahjude hindamist ning seda vajaduse korral lihtsustatud viisil kaasajastada. Vabatahtliku kriisikahjude hindamise puhul ei teki tsentraalset valdkondade ülest vaadet, kuna kõik asutused ei pruugi hindamist läbi viia.

3.5.5 Sagedus

Kuivõrd soovitame muuta ka kriisikahjude hindamise riigi tasandil kohustuslikuks elemendiks, siis on oluliseks otsustuskohaks ka kohustuse sagedus.

Table 19. Kriisikahjude hindamise sagedus

	Stsenaarium 1	Stsenaarium 2
Kirjeldus	Kriisikahjude hindamine (prognoosivalt) peaks olema osa riikliku riskiraporti koostamisest ja toimuma sama sagedusega. Toimunud kriiside mõjude analüüsimine peaks toimuma vajaduspõhiselt.	Kriisikahjusid tuleks (prognoosivalt) hinnata kord aastas ja toimunud kriiside hindamine vajaduspõhiselt.
Plussid	• Toetab riskide hindamise protsessi mõjude hindamise perspektiivist. • Ei tekita täiendavat protsessi, vaid täiendab olemasolevat, mistõttu halduskoormuse suurenemine on vähene	• Kuivõrd kriisikahjud sõltuvad valmisolekust ja haavatavusest, mis võivad ajas muutuda (trendid muutuvad, varustus ja tehnoloogia kulub jms), siis kriisiennetuse ja ettevalmistumiste planeerimisel peaks kahjusid investeeringute planeerimisel uuesti üle hindama. Seeläbi on suurem tõenäosus, et investeeringud tehakse valdkonda, kus need loovad kõige enam väärtust.
Miinused	• Kuivõrd täna tugineb Riigikantselei riigiriskiraporti koostamisel vastutavate asutuste sisendile, siis edaspidi tuleks kriisikahjude hindamiseks kaasata osapooli laiemalt, sh ministeeriumid (ja vajadusel erasektor).	• Kriisikahjude iga-aastane hindamine on suur halduskoormus kõigile kaasatud ekspertidele. • Liiga tihe kriisikahjude ülehindamine võib kaasa tuua pealiskaudse suhtumise, mistõttu olulised muutused võivad jääda tähelepanuta.

Soovitus:

Stsenaarium 1 – kuivõrd kriisikahjude olemus ja prioriteetsus ei ole ajas kiirelt muutuv, siis puudub vajadus kriisikahjusid iga-aastaselt üle hinnata. Igal aastal võiks analüüsida, milliseid meetmeid kriisikahjude leevendamiseks ja kriisideks valmistumiseks tuleks prioriseerida, kuid see ei vaja iga-aastast hindamist – võib tugineda viimase kriisikahjude hindamise käigus tehtud kriisikahjude hindamisel.

3.5.6 Kriisikahjude hindamise metoodika omanik

Metoodika omanik on see osapool, kes hoiab metoodikat asjakohasena, propageerib kasutamist ja juhendab neid, kes vajavad metoodika rakendamisel tuge. Aruteludest turuosaliste ja Riigikantseleiga on ilmnenud, et täna pole ühtegi asutust, kes sooviks proaktiivselt endale kriisikahjude metoodika omaniku rolli

võtta. Sellegipoolest on aruteludest välja koorunud kaks osapoolt, kelle ülesannetega vähemalt mingis ulatuses sobituks ka kriisikahjude hindamise metoodika omaniku roll: Riigikantselei ja RaM.

Table 20. Kriisikahjude hindamise metoodika omanik

	Stsenaarium 1	Stsenaarium 2
Kirjeldus	Kriisikahjude metoodika omanik ja koordinaator peaks olema **Riigikantselei**.	Kriisikahjude metoodika omanik ja koordinaator peaks olema **Rahandusministeerium**.
Plussid	• Riigikantselei on riikliku riskiraporti koordinaatori rollis ja seetõttu on ta positsioonis, kus tema ülesandeks on koguda erinevatelt vastutavatelt asutustelt ja muudelt kriisijuhtimisse panustavatelt asutustelt riskianalüüsiks vajalikku informatsiooni. • Riigikantselei annab sisendit riskianalüüsi panustavatele vastutavatele asutustele riskistsenaariumite valikul. • Riigikantselei on kriisijuhtimise kõige kõrgem tase, mis tähendab, et Riigikantseleil on mandaat anda suuniseid ettevalmistuste ja maandamismeetmete vajalikkuse ja riiklike prioriteetide seadmise osas.	• Rahandusministeerium koordineerib Riigieelarve kavandamist. Kriisiside mõjud väljenduvad riigieelarve tulude vähenemises või kulude suurenemises. Lisaks koonduvad kriiside lahendamiseks tehtud kulutused Rahandusministeeriumisse. Seetõttu on RaM kõige paremini positsioneeritud hindama kriisistsenaariumise otseseid ja kaudseid kulusid. • Kriisikahjude hindamise metoodika võimaldab analüüsida ka maandamismeetmete ja ettevalmistuste kulusid ja kuluefektiivsust ja seeläbi suunata vastavaid investeeringuid. RaM on ka kõige paremini positsioneeritud analüüsimaks, milliseid investeeringuid kriisideks valmistumiseks oleks riigieelarve vahendite juures võimalik teha. • Rahandusministeeriumil on täna riigiüleste kahjude arvutamiseks suurem finantsanalüüsi võimekus kui Riigikantseleil.
Miinused	• Riigikantselei ei kontrolli riigieelarve kujunemist ja valdkondlikku jaotust, et ellu viia vajalikke jätkutegevusi. • Riigikantseleil on täna riigiüleste kahjude arvutamiseks väiksem finantsanalüüsi võimekus kui Rahandusministeeriumil.	• Rahandusministeeriumis puudub kompetents, mis on vajalik erinevate riskisündmuste, mõjude ja meetmete efektiivsuse hindamiseks.

Soovitus:

Stsenaarium 1 – meie hinnangul sobitub kriisikahjude hindamise metoodika omaniku roll tänase korraldusmudeli juures kõige paremini Riigikantseleisse kuna riski- ja kriisikoordinatsiooni sisuline kompetents on antud küsimuses oluliselt tähtsam kui riigi finantside tervikvaade ja finantsanalüüsi võimekus.

3.5.7 Kriisikahjude hindamise metoodika ja andmestiku tehniline hoiustamine

Andmed, millele kriisikahjude hindamisel tugineda, on täna laiali erinevates riiklikes ja erasektori andmekogudes. Kriisikahjude hindamise metoodika loomisel on oluliseks otsustuskohaks asjaolu, kas kahjude hindamiseks oleks tarvilik andmete kokku koondamine ühte süsteemi, või pole selleks veel tänase korralduse juures vajadust. Juhul kui andmete valdkondade ülene koondamine on vajalik, on küsimus ka selles, kas kasutada saaks juba mõnd olemasolevat süsteemi või oleks vaja keskenduda uue süsteemi loomisele.

Table 21. Kriisikahjude metoodika platvorm

	Stsenaarium 1	Stsenaarium 2	Stsenaarium 3
Kirjeldus	Kriisikahjude hindamise metoodika tuleks luua lisaarendusena Riigikantselei **SITIKAS infosüsteemi** külge.	Kriisikahjude hindamise metoodikale tuleks luua **uus eraldiseisev platvorm.**	Tänase võimekuse taseme juures **pole vajadust luua kriisikahjude hindamise metoodikale** eraldi platvorm.
Plussid	• SITIKAS on olemasolev infosüsteem, mida ka kasutatakse nii Riigikantselei, ministeeriumite kui ka riigiasutuste ja KOV-ide poolt. See ei lahendus ei looks uut, osaliselt dubleerivat keskkonda. • SITIKAS infosüsteemil on meeskond, kes tegeleb süsteemi halduse, uuendamise ja arendamisega, mistõttu oleks efektiivne nende kompetentsi kasutada ka kriisikahjude hindamise süsteemi arenduse, hoolduse ja ülalpidamise puhul, mis võimaldaks kaasnevaid kulusid madalamal hoida. • Lihtsustab andmevahetust osapoolte vahel.	• Kuna tegu on uue süsteemiga, mida luuakse spetsiaalselt kriisikahjude hindamise tarbeks, on seda kõige lihtsam kohandada vastavalt metoodika sisulistele vajadustele. • Lihtsustab andmevahetust osapoolte vahel. •	• Võimaldab kokku hoida arenduskuludelt. • Võimaldab kriisikahjusid hinnata kvalitatiivsetele ekspertarvamustele tuginedes. Ekspertarvamused saavad samal ajal aga olla formuleeritud juba valdkondlikult kogutud ja valdkondlikes andmekogudes sisalduvatest andmetest lähtuvalt.
Miinused	• Täiendava arenduse vajadus, mille puhul tuleb arvesse võtta olemasoleva süsteemi tehnilisi piiranguid.	• Kriisikahjude hindamist saab teha nii andmepõhiselt kui ka kvalitatiivsetele ekspertarvamustele tuginedes. Kuivõrd tänased andmete kättesaadavuse piirangud tingivad vajaduse viia läbi kahjude hindamist kvalitatiivsele	• Nõuab metoodika rakendajalt rohkem aega õigete andmete tuvastamisel ja kasutamisel.

- Kriisikahjude hindamist saab teha nii andmepõhiselt kui ka kvalitatiivsetele ekspertarvamustele tuginedes. Kuivõrd tänased andmete kättesaadavuse piirangud tingivad vajaduse viia läbi kahjude hindamist kvalitatiivsele ekspertteadmusele tuginedes, võib täiendav arendus olla ebavajalik.

ekspertteadmusele tuginedes, võib täiendav arendus olla ebavajalik.

- Täiendava keskkonna loomine suurendab infomüra ja dubleerib osaliselt juba olemasolevaid süsteeme.
- Uue platvormi arendus ja ülevalpidamine kallim kui tööriista juba eksisteerivale platvormile tõsta.

Soovitus:

Stsenaarium 3 – Kriisikahjude hindamise metoodika iseenesest ei vaja spetsiifilist tehnilist keskkonda. Metoodika on kaks rakendusviisi: toimunud kriiside kahjude kokku arvutamine, milleks piisab koondfailide loomisest (nt Excel tabelid, mis sisaldavad vastavaid arvutusi kõikides valdkondades), ja kriisidega kaasnevate kahjude prognoosimine, mis võib vajada ühtse kulude andmebaasi loomist.

Arvestades Eesti kriisikahjude prognoosimise tänast taset, ei ole meie hinnangul infosüsteemi loomine prioriteetse tähtsusega. Metoodika põhialused liidetakse KOV riskihindamise metoodika juurde ning täiendavat andmebaasi metoodika talletamise tarbeks luua ei ole vaja. Esmalt on oluline juurutada avalikus sektoris metoodika kasutamist (kahjudest mõtlemist kolmes kategoorias ja otseseid ja kaudseid kahjusid arvesse võttes). Kuivõrd soovitame kriisikahjusid hinnata ekspertide töögruppi kaasates, leiame, et ka ilma tsentraalse süsteemi loomiseta saab olla võrdlemisi kindel valdkondlik teadmise edasikandumises. Arvutustes kasutatud kriisikahjude alusandmestikule saab viidata kahjude koondtulemis ning kasutajal ei ole otsest vajadust ise alusandmestike tasandile minna. Kriisikahjude metoodika kasutajaid ei ole palju ning lisaks ei ole kriisikahjude hindamise sagedus ilmselt selline, mis tingiks vajaduse informatsiooni tsentraalsesse süsteemi koondada.

3.6 Stakeholder impacts on disaster loss methodology

Table 22. Stakeholder impacts on Disaster Loss methodology

	The Government Office	Responsible agencies and ministries
Organization	The GO will be responsible for creating the centralized understanding of disaster loss (both for accounting and modelling). It is required that the GO has personnel with required competences to calculate/estimate disaster loss and	The authorities should have an appointed person that will be in charge of collecting and analyzing disaster loss data.

	coordinate the process across different ministries and agencies.	
Process	The GO should collect the disaster loss data input from ministries or directly form agencies, assess the completeness and relevance of input received, eliminate overlapping calculations and loss duplications in input reported by ministries/agencies, and add up the total disaster loss for the society. The GO should also use disaster loss modelling to assess the impacts of the risk events considered in the National Risk Assessment. Based on the results of disaster loss modelling, the GO should advocate for prioritized investments into crisis preparedness and resilience.	During crisis agencies should account for the loss caused by the crisis to their organization and for third parties (both private and public sector) within their area of responsibility. This should be communicated to ministries who are collecting the disaster loss for their sector (or directly to the GO). Ministries collect the disaster loss data from the sector and their agencies and communicate it to the GO. Agencies and ministries should use disaster loss modelling in their risk assessments.

3.7 Critical uncertainties concerning the disaster loss methodology

There are some uncertainties in the Estonian risk and crisis management policy and system set-up which may impact the successful implementation of the disaster loss methodology. Table 23 gives an overview of the main uncertainties which may hinder the usage of the disaster loss methodology.

Table 23 Uncertainties concerning the disaster loss methodology

Critical uncertainties	Potential negative impact caused by the uncertainty
Unclear overall purpose among stakeholders and potentially different ownership options	Calculating disaster loss is not currently part of most risk and crisis management activities carried out by the Estonian ministries and agencies. There is currently no commonly shared vision in relation of the purpose and use-cases of the methodology – whether the authorities should use the methodology for disaster loss accounting for past disasters only or also use it as a disaster modelling tool for future events. Consequently, some uncertainties also concern the most suitable methodology owner and coordinator for disaster loss calculations across different stakeholders. Our recommendation would be to assign this responsibility to the GO, as they are responsible for the crisis coordination, are most involved in the development of the methodology and have a central government cross-sectoral view to the societal impacts. However, in the long term the ownership could also move to the Ministry of Finance (who is responsible for the national budget) or to Bank of Estonia (who is currently carrying out some similar high level impact analysis for different events). This unclarity of future role could hinder the motivation of the responsible owner to develop the methodology and the implementation may be slower than anticipated.
Setting specific roles	The current approach we have recommended assigns the GO the main responsibility for implementing the disaster loss methodology and composing the cross-sectoral disaster loss assessment results. However, the GO could assign different components of the methodology for assessment and calculations to responsible agencies or ministries. This approach may create a situation where the responsibility is somewhat dispersed and not clear. Additionally, it may create a situation where some loss assessment is duplicated in the assessments of different agencies or ministries.
Limited data availability	As the risk and crisis data has never been systematically collected and managed, the data availability for disaster loss accounting and modelling may be limited and therefor the results of the assessments may not be as meaningful.

4 Description of emergent technologies

Emerging technology is a term generally used to describe a new technology. The term commonly refers to technologies that are currently developing, or that are expected to be available within the next five to ten years, and is usually reserved for technologies that are creating, or are expected to create, significant social or economic effects.[15]

In order to fill the gaps which, we have mentioned above, some new technological features and changes can be of assistance. Therefore, we looked into use-cases of different emerging technologies in the crisis management area as well as trends and processes which are being made/have been made all over the world.

Technological advancement and innovation have created new opportunities for enhancing disaster resiliency and risk reduction. Developments in disruptive technologies – such as artificial intelligence (AI), the Internet of Things (IoT), and Big Data and innovations in such areas as robotics and drone technology are transforming many fields, including disaster risk reduction and management. The rapid spread of supporting digital infrastructure and devices such as wireless broadband networks, smartphones and cloud computing have created the foundation for the application of disruptive technologies for disaster management.[16]

4.1 Big data developments

Big Data and crisis analytics[17] is a term used to refer to the analysis of large data sets for disasters. Due to advances in Information and Communications Technology and processing of large data sets, the ability to respond to disasters is at an inflection point. **Big data tools can today process large amounts of crisis-related data** (e.g., user-generated, sensors) **to support more effective disaster response.**

Companies and institutions worldwide are producing big data tools for **gathering, mining, visualising, and interpreting large data sets**. These tools are becoming a part of the regular set of assets of organisations and will be essential in CM situations. While the data available in a crisis is only in part known upfront, **the main advantage of the availability of sophisticated analytics tools is the short amount of time that will be necessary to ingest new data sources and the range of tools available for fast analysis**. This makes it much more realistic to implement ad-hoc analysis on new data streams, something which is aligned with the rapid pace of decision making during a crisis.

The main future developments for big data are the following:[18]

- **Radical transparency**. As information becomes more readily available within and across sectors, business models and decision practices based on proprietary closed data assets tend to become obsolete and be replaced.
- **Simulating decisions, anticipating changes.** Many important decisions cannot be tested ahead, and their outcomes can only be measured after some time, usually aftereffects cannot be reversed. This is the case for government, cities, or businesses. Big data may offer an opportunity of testing outcomes on a small scale at first.

[15] Winston & Strawn LLP, https://www.winston.com/en/legal-glossary/emerging-technology.html

[16] ITU, Disruptive technologies and their use in disaster risk reduction and management (2019) https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Documents/2019/GET_2019/Disruptive-Technologies.pdf

[17] ITU, Disruptive technologies and their use in disaster risk reduction and management (2019) https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Documents/2019/GET_2019/Disruptive-Technologies.pdf

[18] Beinat, Euro & Bannink, Iris & Oldani, Gianluca & Sagl, Gunther & Steenbruggen, John. (2012). Social Media, Internet of Things and Big Data - A Review of Emerging Technologies for Crisis Management.

- **Personalisation and customisation**. Pattern analysis and segmentation can become far more granular and real-time.
- **Automating decision-making.** Algorithms applied to data streams which collect information in real-time can be more effective at some decision-making tasks than humans.

4.1.1 Examples of using big data

There are several examples from all over the world where big data is used in order to prepare or deal with different crises and disasters.

The first example comes from China. Since 2009, The National Natural Disaster Management System (NNDIMS) has been operated in China. The NNDIMS combines information technology and operational standards, based on China's Natural Disasters Statistical Regulation**.** It has realised the comprehensive management of various information such as natural disaster loss information, disaster relief work information, and on-site multimedia information. It has provided a unified disaster statistics and reporting platform across the six-level disaster management organisations, namely central government, province, city, county, township, and village, that forms a hierarchical model of level-by-level reporting for ordinary disasters and on-site direct reporting for major disasters. At present, the system receives more than 100,000 disaster reports annually, which plays an important role in the response and disposal of major disasters in recent years and provides important information supporting disaster relief work.

With the support of the NNDIMS, the number of disaster cases reported by provinces has increased from less than 1,000 to more than 100,000, and the reporting time has sharply decreased to 12.3 hours. 90% of disaster cases can be submitted within 24 hours. 50% of cases can be submitted within 6 hours, and major disasters can be submitted within 1 hour.

As for future development, the National Disaster Reduction Centre of China (NDRCC) will focus on applying big data technologies to disaster management:

- NDRCC will focus on the **whole disaster category**, the whole process, and the whole chain. Using big data to analyse the disaster chain, event chain, complex issues, and their coupling relationships, to improve the capacities of comprehensive management and decision-making.
- **Risk identification, assessment, management, and control**. Discovering and identifying hidden risks and weak segments of disaster prevention and mitigation through high-precision and long series of massive disaster data. Establishing a risk assessment method and decision-making system by using disaster loss data.
- **NDRCC will focus on accurate disaster relief, emergency response and decision-making.** NDRCC will carry out capacity-building projects such as disaster trend analysis and precise statistics assessment based on disaster big data, to provide a scientific basis for emergency decision-making and disaster relief policymaking.[19]

Another good example comes from the South Korean government. This includes strengthening its ability to collect and analyse different types of data to implement the common operating framework and **facilitate cross-silo information sharing**. The Infectious Disease Control and Prevention Act (KCDC) established an International Traveller Information System to share patients' travel histories with hospitals when needed. Communication channels between central and local governments were created to facilitate information sharing (e.g., social media and daily meetings in the outbreak of 2018 MERS-CoV). With years of the reform efforts and shared experiences, diverse policy actors developed shared understandings of the problem. Goal-driven learning and adaptation made South Korea prepared for a future infectious disease, which unfortunately happened in 2020.[20]

[19] United Nations Office for Disaster Risk Reduction (2021) Trilateral best practices: Application of technology for reducing disaster risks in China, Japan and Korea https://www.tcs-asia.org/data/etcData/PUB_1632720421.pdf

[20] Lee, S., Yeo, J., & Na, C. (2020). Learning From the Past: Distributed Cognition and Crisis Management Capabilities for Tackling COVID-19. The American Review of Public Administration, 50(6–7), 729–735. https://doi.org/10.1177/0275074020942412

One more example includes how researchers used Big Data techniques to explore **financial transactions before, during and after Hurricane Odile struck the Mexican State of Baja California Sur in September 2014, to analyse its economic impact on those affected**. The analysis identified which groups were most affected for targeting post-disaster assistance and how long it took to return to normal, and generated estimates of the economic impact. **It would be attractive to develop an ex-ante model so that the financial response to disasters could be analysed in real time to provide ongoing feedback loops to relief efforts.**[21]

4.2 Social media usage in disaster management

The use of social media for emergencies and disasters[22] on an organisational level may be conceived of as two broad categories. **First, social media can be used somewhat passively to disseminate information** and receive user feedback via incoming messages, wall posts, and polls. **A second approach involves the systematic use of social media as an emergency management tool.**

Systematic usage might include: 1) using the medium to conduct emergency **communications and issue warnings**; 2) using social media to **receive victim requests** for assistance; 3) **monitoring user activities** and postings to establish **situational awareness**; and 4) using uploaded images to create **damage estimates**, among others.

Social media can be used as a tool **by providing information and instructions, with real time alerts and warnings**. Social media represents one more channel for emergency services to send an alert and warning. This is the case for natural disasters like storms or tornadoes. Provision of information and instructions with social media like blogs can be used to provide advice by posting information such as emergency phone numbers, location of hospitals requiring blood donations, evacuation routes, etc.

Social media can also be used **to mobilise volunteers both during and after a crisis**. Social media can also be used to indicate willingness to help in the event of an emergency. In addition, it can improve the disaster response by mobilising online volunteers far away from the epicentre of the crisis to relay information provided by emergency services.

4.2.1 Examples of using social media

Some examples of using social media during a crisis include a number of different groups deployed by Twitter for a variety of purposes following severe flooding in **Chennai, India, in 2015**. Although emergency telephone numbers were established, they were overloaded, making social media such as Twitter a popular method for communication for those with Internet access. The Twitter live, real-time public platform was used by nongovernmental organisations, the public, government agencies and the media to share and exchange information. This resulted in unprecedented collaboration on the platform in responding to the crisis. Twitter India publicised three hashtags to be used during the flood, depending on the nature of the tweet, for citizen groups to help agencies on the ground. A variety of information was shared, including helpline phone numbers, updated train schedules, weather forecasts, relief efforts and safety tips. This helped to magnify critical messages, organise relief efforts, assist government agencies, warn the public and provide information in real time to citizens trapped in the floods.[23]

Another useful social media platform would be Facebook. Facebook has a **Disaster Maps** tool showing where users are located, moving to, and whether they are using the Safety Check feature. The Disaster Maps tool has been used by relief organisations to identify where Internet connectivity required restoration in Puerto Rico following Hurricane Maria, and where respiratory masks were needed during the Southern California Wildfires. The maps are particularly useful for examining mobile

[21] ITU, Disruptive technologies and their use in disaster risk reduction and management (2019) https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Documents/2019/GET_2019/Disruptive-Technologies.pdf

[22] Preparecenter, Social Media in Disasters https://preparecenter.org/topic/social-media-disasters/#:~:text=Social%20media%20can%20be%20used%20as%20a%20tool%20by%20providing,disasters%20like%20storms%20or%20tornadoes.

[23] ITU, Disruptive technologies and their use in disaster risk reduction and management (2019) https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Documents/2019/GET_2019/Disruptive-Technologies.pdf

cellular network coverage, cell phone battery charging and population movement during a disaster. For example, the maps were used to show 2G network coverage after a volcanic eruption in Alotenango, Guatemala.

Geolocation-aware[24] mobile crowdsourcing apps (such as GeoChat or Google Crisis Map), are leveraging the power of social media and smartphones to provide unprecedented levels of citizen engagement and participation in their local and wider communities. Crowdsourced mapping examples (some are in real-time) include the following:

- Sickweather, an online social health network for sickness (e.g. flu) forecasting and mapping;
- the crowdsourced real-time radiation maps that made the news headlines following Japan's Fukushima Daiichi nuclear disaster in March 2011;
- 'Lunch Break' Web map, a poll and map launched for the International Exchange in Nutrition, Dietetics and Management that provides a unique look at lunchtime eating patterns in North America.

These apps and maps, freely available to the public online, are excellent examples of how crowd-enabled systems are revolutionising the way we tackle problems and allowing us to monitor and act upon almost anything, anywhere, in real-time.

In Cambodia, the Ministry of Health uses **GeoChat**[25] for disease reporting and to send staff alerts and rapidly escalate response to potential outbreaks, while in Thailand, more than 900 facilities within the Hospital Network exchange information and get alerts to monitor influenza outbreaks in real-time from facilities across the country. GeoChat was also deployed during the 2010 earthquake relief efforts in Haiti to coordinate field teams' activities and provide remote support from outside the earthquake zone.

Google has created a **Crisis Map**[26] (google.org/crisismap) for users to help locate critical emergency information. The maps feature satellite imagery and relevant information such as the weather, flood zones, evacuation routes, shelters, and power outages. Users can zoom in on specific events such as wildfires, as shown in the map below. Crisis Map mainly shows the situation in the United States of America, drawing on data from the United States National Hurricane Centre and weather.com.

Another example of using social media includes **"Gator".**[27] In an attempt to address the challenge of building a detailed taxonomy in different languages – including local dialects, jargon and alphabets, Pulse Lab Jakarta launched Translator Gator in 2016, a language game the Lab developed to create text mining dictionaries for recognizing sustainable development-related conversations in Indonesia. In 2017, the Lab released Translator Gator 2 to test whether crowdsourcing can be used to inform disaster management efforts. The aim of the project is to engage the 'wisdom of the crowd' to create taxonomies for disaster management for ten Association of South-East Asian Nations (ASEAN) countries and for Sri Lanka. **The expected outcomes of the project are to (a) translate disaster keywords in multiple languages that can ultimately be used for computational research initiatives; (b) use social media to understand the behaviours of affected population before/during/after a disaster, and to improve communication with these communities; and (c) raise disaster preparedness awareness in multiple countries.**

[24] Kamel Boulos, M.N., Resch, B., Crowley, D.N. et al. Crowdsourcing, citizen sensing and sensor web technologies for public and environmental health surveillance and crisis management: trends, OGC standards and application examples. Int J Health Geogr 10, 67 (2011). https://doi.org/10.1186/1476-072X-10-67

[25] Kamel Boulos, M.N., Resch, B., Crowley, D.N. et al. Crowdsourcing, citizen sensing and sensor web technologies for public and environmental health surveillance and crisis management: trends, OGC standards and application examples. Int J Health Geogr 10, 67 (2011). https://doi.org/10.1186/1476-072X-10-67

[26] ITU, Disruptive technologies and their use in disaster risk reduction and management (2019) https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Documents/2019/GET_2019/Disruptive-Technologies.pdf

[27] ITU, Disruptive technologies and their use in disaster risk reduction and management (2019) https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Documents/2019/GET_2019/Disruptive-Technologies.pdf

An example where big data and creating a new social media platform were done together would include **Haze Gazer.**[28] Forest and peatland fires, which occur on an annual basis in Indonesia, affect the entire South-East Asia region, resulting in extensive environmental destruction and threatening livelihoods. To better support the affected populations, the Government of Indonesia is looking for more timely and effective means of tracking and managing the impact of fire and haze events. In response, Pulse Lab Jakarta developed Haze Gazer, a crisis analysis and visualisation tool that provides **real-time situational information from various data sources to enhance disaster management efforts.** The prototype enhances disaster management efforts by providing real-time insights on (a) **the locations of fire and haze hotspots; (b) the strength of haze in population centres; (c) the locations of the most vulnerable cohorts of the population; and, most importantly, (d) the response strategies of affected populations, including movement patterns and in-situ behavioural changes**. The platform includes the national complaint system in Indonesia called LAPOR!, citizen journalism video uploads to an online news channel, and real-time Big Data such as text-, image- and video-oriented social media.

Another example comes from Japan: in order to solve the problem regarding large-scale dis-communication in case of a disaster, 'Relay-by-Smartphone' was developed to communicate with people to share a message about their safety and rescue requests in the affected area. 'Relay-by-Smartphone' engine enables communication with another smartphone up to 70 metres away. If the person who holds data reaches an area where the internet is available, the data can be uploaded to the cloud. An app powered by the 'Relay-by-Smartphone' engine can be easily installed and then its use is ready to go.[29]

4.3 Internet of Things (IoT) usage in emerging technologies

The Internet of Things[30] describes the network of physical objects - "things" that are embedded with sensors, software, and other technologies to connect and exchange data with other devices and systems over the internet. These devices range from ordinary household objects to sophisticated industrial tools.

The past few years have seen IoT emerging as the technology of the century. People can connect their everyday use devices (kitchen appliances, thermostats, baby monitors, cars) to the internet via embedded devices. This has made communication seamless between people, processes, and things. Using low computing, the cloud, big data, analytics, mobile technologies as a medium, human intervention has been minimalized. This has made physical objects capable of data collection with the least intervention.

Table 24 below shows different possible use-cases for IoT in Disaster Management.

Related to IoT is Street-level imagery,[31] which is increasingly available around the world, providing a three-dimensional view of the earth at ground level. There are several commercial and open-source providers of geocoded street-level maps populated by images collected by the companies directly or crowdsourced from users. Street-view maps are available for at least some parts of almost all APEC economies and fill important gaps in information on the built environment that is not available through aerial or satellite imagery. Improvements in the availability and affordability of camera technologies, will continue to enhance the coverage, quality, and frequency of street-level imagery.

[28] ITU, Disruptive technologies and their use in disaster risk reduction and management (2019) https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Documents/2019/GET_2019/Disruptive-Technologies.pdf

[29] United Nations Office for Disaster Risk Reduction (2021) Trilateral best practices: Application of technology for reducing disaster risks in China, Japan and Korea https://www.tcs-asia.org/data/etcData/PUB_1632720421.pdf

[30] Analyticssteps (2020) https://www.analyticssteps.com/blogs/4-ways-which-iot-helps-disaster-management

[31] Asian Development Bank Organisation for Economic Co-operation and Development (2020) LEVERAGING TECHNOLOGY AND INNOVATION FOR DISASTER RISK MANAGEMENT AND FINANCING https://www.preventionweb.net/publication/leveraging-technology-and-innovation-disaster-risk-management-and-financing

Table 24. Using IoT in Disaster Management

Prevention	Preparation	Response	Recovery
Monitoring can be greatly facilitated by using real-time sensor-based data. Examples include: Vehicles using telematics. Water levels using sensors. Sensors to detect wildfires, tornadoes, earthquakes, cloudbursts, and volcanic activities. Critical infrastructure protection through predictive maintenance of disaster management assets. Hazard mitigation through monitoring of the environment using sensors for pollutants and contaminants including radioactive scenarios. Enabling early warning monitoring system.	Use of sensor technology to address real-time stock and supplies replenishment spares planning, and automated indent processing. Asset track and trace. Use of complex event processing for notification of an action based on capturing streaming sensor data resulting in predictive resource deployment.	Vehicle tracking and GIS integration. Use of sensors to monitor the movement of key personnel. Using NFC for geofencing and parameter fencing. Situational awareness and incident management through streaming data, unstructured data handling, predictive analysis, big data, complex event processing, and social media analytics.	Use of sensor technology for identification and authentication of beneficiaries. Use of smart cards and RFIDs for relief disbursal. Create a virtual logistics network that allows hub operators and others to monitor traffic towards and within a hub in real-time and facilitates communication between all involved parties.

4.3.1 Examples of IoT use-cases

By the end of the 20th Century, South Korea had developed their Flood Forecasting and Warning System, which analyses real-time data observations of vulnerable areas. Korea also developed the Automatic Precipitation Warning Facility, which triggers a warning siren according to the level of precipitation.

Using a radar system, the Flood Forecasting and Warning System informs the public about areas threatened by a high risk of flooding based on precipitation forecast data. The facility acts as a warning system that observes, analyses precipitation data, and disseminates real-time warning comprising precipitation observatories and warning stations. The system functions by establishing automatic rainfall observation stations (water levelling) at the upper and middle areas of the mountain valley, as well as an automatic warning system at the lower area. The automatic remote observation station at the local Disaster Prevention and Countermeasures Headquarters then receives real-time data and sends out alerts to local administrative offices and the public.[32]

South Korea has also adopted an integrated risk-management approach that leverages the country's strong early warning systems (EWS). The EWS monitors information pertaining to potential natural, man-made and social disasters. This information is captured in the Integrated Situation Centre which

[32] United Nations Office for Disaster Risk Reduction (2021) Trilateral best practices: Application of technology for reducing disaster risks in China, Japan and Korea https://www.tcs-asia.org/data/etcData/PUB_1632720421.pdf

includes 4 sub-systems to monitor and disseminate information before and during a crisis. In the event of a threat, alerts are sent out through the internet report centre and through a cell phone broadcasting service that sends a message to the citizens' cell phones to inform them about evacuation measures.[33]

4.4 Other crisis management tools and technologies

Some emerging technologies in crisis management are outside direct the area of big data, IoT and social media. These technologies include for example using artificial intelligence (AI), drones, and due to the fast pace of advancements in technology, the list of examples in this category can expand much more.

As for the future, AI could have tremendous impact for disaster management, from potentially predicting earthquakes to quickening recovery and response times. Humanitarian groups are hoping to speed up map creation by using machine learning in computer software to extract objects such as buildings and roads from aerial images.[34]

4.4.1 Examples of other crisis management tools and technologies

For example, AI is being used to analyse past data to predict what is likely to happen in the event of a disaster. **Optima Predict software processes information from emergency response systems to optimise ambulance routes**. The data can be integrated with online dashboards so that emergency personnel can respond in real time.

Currently, Japan is a pioneering centre for the use of robots in disasters. The Human–Robot Informatics Laboratory of Tohoku University has developed several types of robots for disaster response, including a snake-like robot with a camera that can crawl over obstacles, follow walls, and make turns in tight spaces. Research is ongoing to augment search-and-rescue dogs using cameras, Global Positioning System and inertial measurement units, which are being designed to be small and light to fit on a dog pack. Damage to the Fukushima Daiichi Nuclear Power Plant in the 2011 earthquake triggered significant robot research due to radiation preventing humans from carrying out direct clean-up activities. One of the biggest challenges has been determining what happened to the fuel inside the core of the reactor. Various robots were used to penetrate the core, but without success. Finally, in 2017, a small robot designed to operate underwater with severe radiation exposure succeeded in locating the missing fuel inside the reactor core. Japanese manufacturer Honda is developing a disaster response robot that can walk, scale obstacles, and climb ladders. If the prototype reaches fruition, it could have a major impact for rescue operations and clearing hazardous materials.[35]

An example of using drones for disaster damage assessment comes from Vanuatu. In 2015, Cyclone Pam struck the island, leaving around 75 000 people homeless. **The World Bank contracted two drone teams as the first project of using unmanned aerial vehicles (UAVs) for disaster resilience.** The drone activities were supervised by the Humanitarian UAV Network. The Civil Aviation Authority of Vanuatu reviewed the drone use for compliance with regulations and provided usage guidelines. The imagery collected is owned by the Government of Vanuatu and published on Mapbox (an open-source mapping platform). This is shared with the Humanitarian OpenStreetMap Team and Micromappers to draw roads and buildings and evaluate damage to individual structures. Volunteers uploaded and geo-tagged images from social media to overlay on the map.

The higher resolution of damages available with drone photography provides a more accurate figure of the cost of rebuilding compared with traditional methods. The drones also identify the most seriously affected communities so that assistance can be prioritised. Even though there were challenges surrounding connectivity, the weather conditions, and data formats. Nevertheless, the experience

[33] OECD (2015), The Changing Face of Strategic Crisis Management, OECD Reviews of Risk Management Policies, OECD Publishing, Paris, https://doi.org/10.1787/9789264249127-en.

[34] ITU, Disruptive technologies and their use in disaster risk reduction and management (2019) https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Documents/2019/GET_2019/Disruptive-Technologies.pdf

[35] ITU, Disruptive technologies and their use in disaster risk reduction and management (2019) https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Documents/2019/GET_2019/Disruptive-Technologies.pdf

provided valuable insights, with the drones providing the fastest method of mapping the damaged areas.[36]

[36] ITU, Disruptive technologies and their use in disaster risk reduction and management (2019) https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Documents/2019/GET_2019/Disruptive-Technologies.pdf

5 Recommendations

5.1 Recommendations

Chapters 3.2 and 3.5 gave an overview of different implementation alternatives for different LMs' crisis management toolbox as well the national disaster loss methodology. Numerous variables were considered under each section and considerations for our recommendation were described in detail in tables above. In this chapter, we will give a summary overview of all the recommended considerations and describe the preferred to-be scenario for the future implementation of both the LMs' crisis management toolbox as well as the national disaster loss methodology.

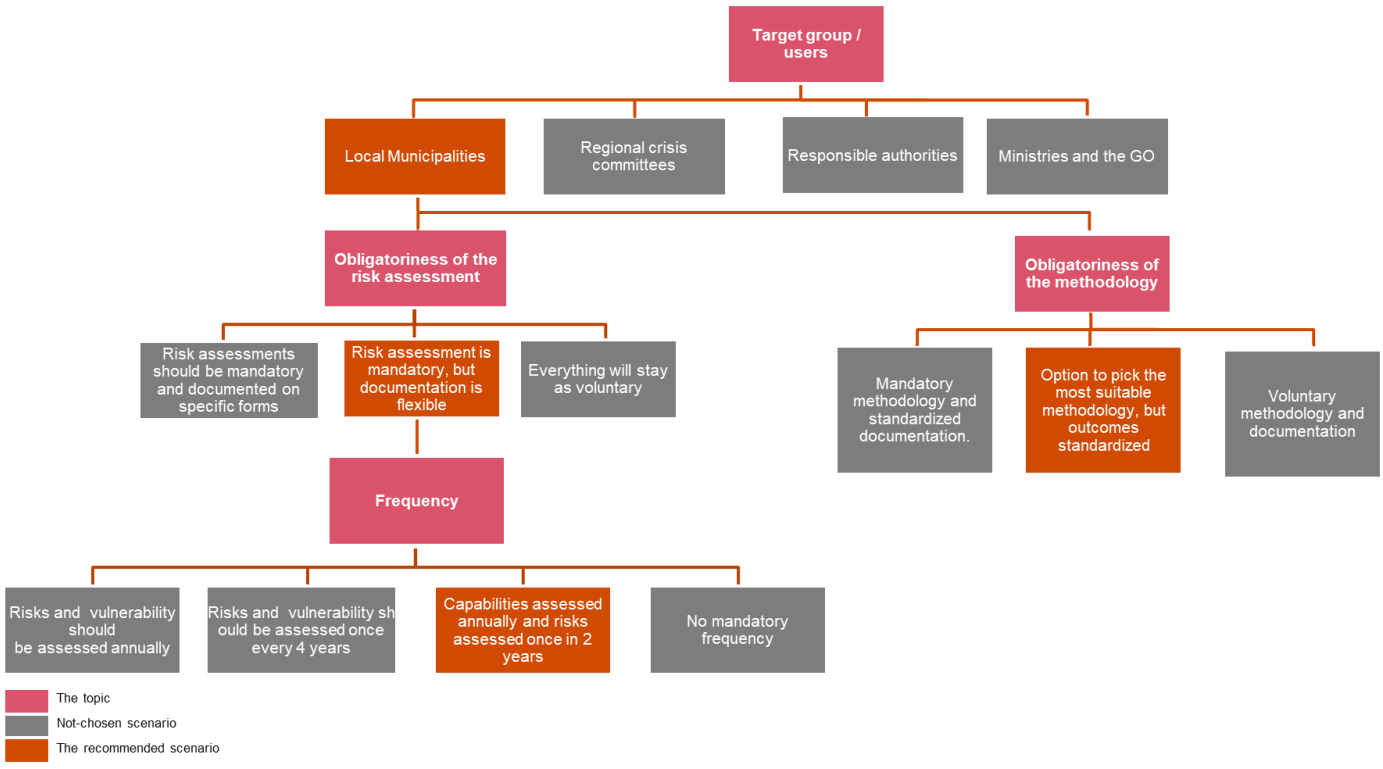
5.2 Recommendations for the local municipalities risk management toolbox

The considerations regarding the municipality's risk management toolbox may be divided into three categories: the overall approach, governance, and operational aspects. The following chapter will give a short overview of recommended to-be scenarios under each category.

5.2.1 Overall approach to local municipalities risk management

To design the approach to the local municipalities risk management toolbox, four aspects (the target group, different levels of municipalities obligations and risk assessment frequency) needed to be evaluated. Different alternatives for each question can be presented in a simplified decision tree format – see Figure 5 below. Our recommendation for each aspect is highlighted in an orange box.

Figure 5. To-be scenario in the form of a decision-tree for overall approach to LMs risk management



Q1 Target group / users. Who should be responsible for assessing the risks from the municipality's perspective? Is it the LMs themselves or should it be done more centrally – by regional crisis committee, responsible authorities, ministries or GO who would feed LMs with relevant risk assessment results and guided action plans? As the main issue the current project aims to solve is the

low-risk awareness amongst LMs, it is clear that LMs must undertake the risk assessment themselves in order to increase their awareness and strengthen their ownership of the risk management. Other institutions may only act in a supporting role via guidance and information sharing.

Q2 Obligatoriness of the risk assessment. After selecting the target group for the methodology, questions considering the obligatoriness follow. Firstly, we considered whether carrying out overall risk assessment should be made mandatory for local municipalities. We recommend making it mandatory, because voluntary approaches currently used have not resulted in sufficient risk management actions among municipality activities. This has generated the situation where low risk awareness is a widespread problem for municipalities.

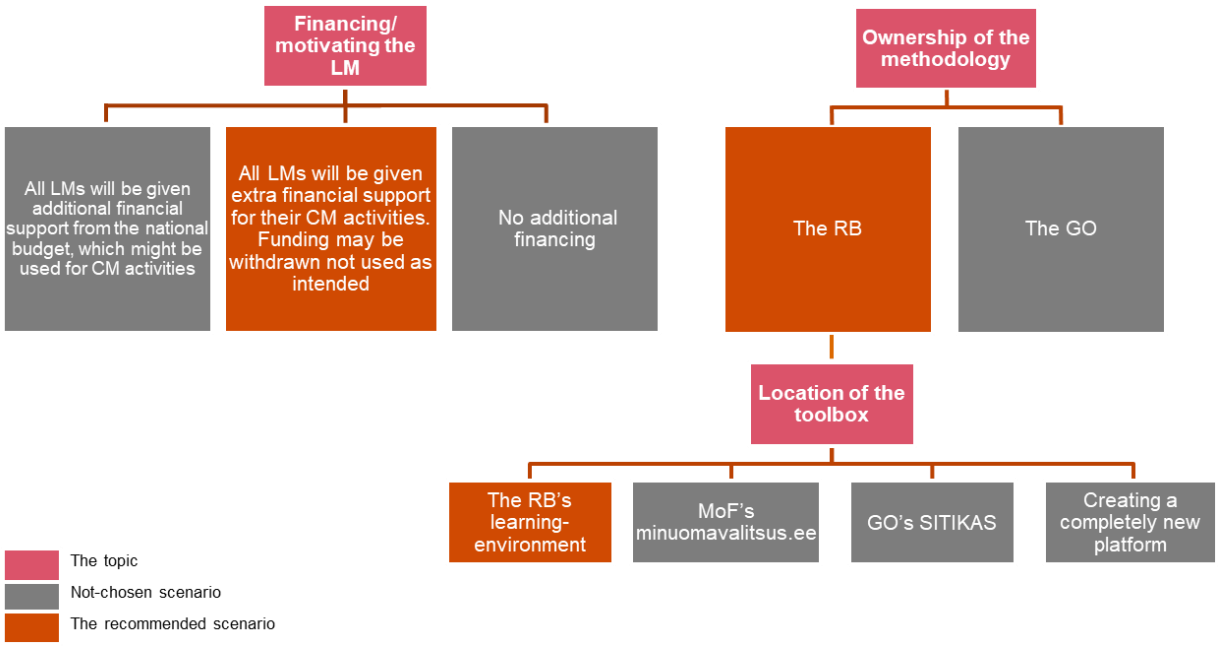
Q3 Obligatoriness of the usage of methodology. When it comes to the selection of methodology for the mandatory risk assessment, we believe that the individual needs of LMs and the fluctuating risk management maturity levels demand flexibility. Therefore, we believe that the methodology created should be considered as a recommendation or optional support mechanism. If municipalities feel their needs can be better met by using an alternative methodology, they should be allowed to deviate from the recommended approaches. However, the risk assessment output should be standardised to allow more optimal knowledge sharing across LMs and between institutions.

Q4 Frequency. With regards to frequency of risk assessment, we recommend adopting the approach recommended by the OECD. Municipalities should be assessing their risk environment as often as needed (when new risks emerge and situations change), but not less frequency than once every two years. However, as capabilities of the municipalities are more likely to change over time, we recommend reviewing the capabilities once a year. The capability assessment will be a legal requirement for the municipalities according to the new Preparedness law, but even if performing the risk assessment will remain voluntary, the proposed frequency can remain as a guiding principle.

5.2.2 Governance of municipalities risk management methodology

Implementation of the local municipalities risk management toolbox involves three considerations: financing / motivation of municipalities, ownership of the methodology/toolbox and technical hosting of the system. Please find the alternatives considered and to-be scenario proposed on Figure 6 below.

Figure 6. To-be scenario decision-tree for governance of the methodology



Q5. Financing/motivating the LMs. As the municipalities are autonomous, assigning additional tasks to them should also involve provision of resources that allow carrying out the new tasks. We would recommend providing the municipalities with additional resources for a specific purpose to be used for crisis management activities. The use of the funds, however, should be monitored, and if the municipalities do not use funds for risk assessment and crisis management purposes as intended, the funds could be withdrawn. In our opinion that should provide the municipalities with sufficient resources as well as motivation to invest meaningfully in risk mitigation.

If risk assessments are not made mandatory, the municipalities could still be motivated to carry out risk assessment and crisis management tasks via the additional dedicated funding.

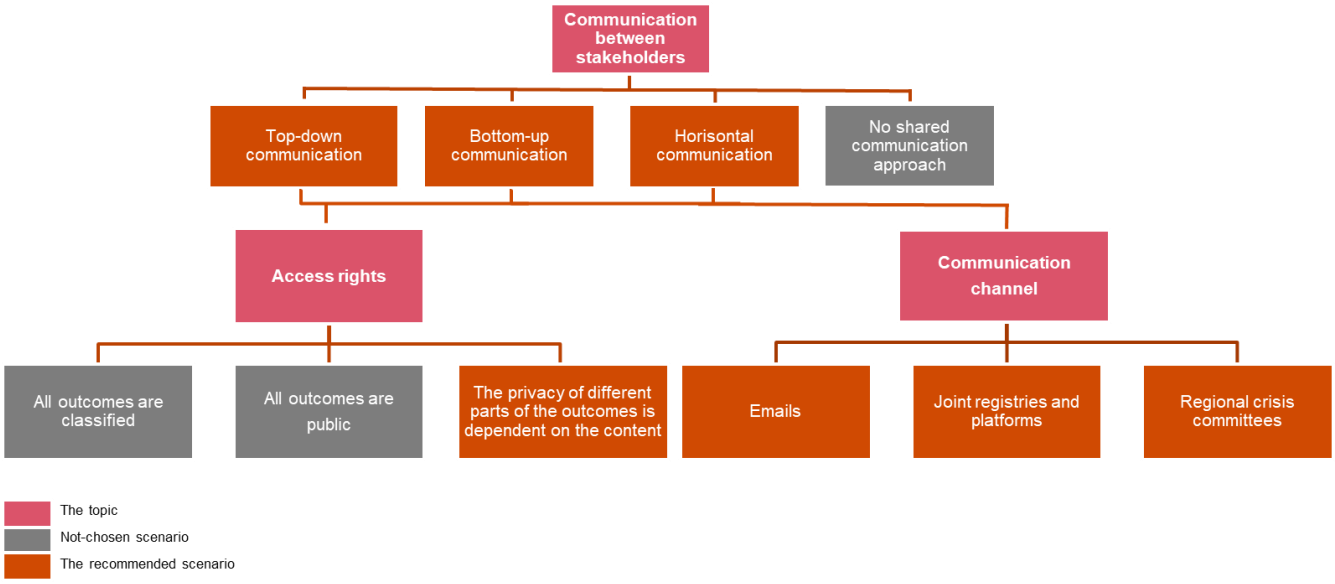
Q6. Ownership of the methodology. Ownership of the toolbox needs to be determined regardless of whether the risk assessments will become mandatory for local municipalities. The owner of the methodology should be responsible for the upkeep and development of the methodology. The owner should also provide support for the municipalities if they have questions regarding the application of the methodology. If the risk management becomes mandatory, the owner should also become responsible for quality review, and when the application remains voluntary, their role should be to promote the usage. We considered GO and RB as potential owners of the toolbox. As RB current responsibilities involve supporting LMs in their risk and crisis management activities and the technical placement of the methodology is suggested to be in RB's platform, it would be most efficient to make RB the owner of the overall methodology as well.

Q7. Hosting of the methodology. As we consider the RB to be the most suitable owner for the LM's crisis management methodology, the technical hosting of the methodology should also take place on the RB's platform. RB has already gathered other relevant risk management supporting materials onto the same platform, the LMs will be using the platform for various crisis exercises coordinated by the RB and therefore we can avoid duplicating systems.

5.2.3 Operational aspects of municipalities risk management toolbox

There are also three partially interdependent questions to consider regarding the methodology operational matters as well: communication needs, communication channels and access rights / privacy issues. Please find Figure 7 below for considered alternatives and proposed to-be scenario choices.

Figure 7. To-be scenario decision-tree for communication and access rights



Q8. Communication between the stakeholders. In terms of implementation, we wish to avoid a situation where the risk assessment is done just for a "tick in a box" purpose. As international practice review shows, risk assessments should feed into one-another. This does not only keep other

stakeholders informed, but also provides motivation and additional meaning for the municipalities risk assessments. Therefore, we recommend that a communication system is established where the information and different risk assessment results are shared between responsible agencies and municipalities, and also as a minimum between neighboring regional municipalities.

Q9. **Privacy of the outcomes.** If risk assessment deliverables become shared amongst agencies and municipalities, access rights become a question to consider. It should also be determined to what extent the outcomes are shared with the general public. We recommend making most of the results available to everyone but keep the option available to restrict access to sensitive or potentially misused elements of the risk assessment results. This should allow a proper balance between transparency and additional risks from exposing potentially sensitive information.

Q10. Communication channel. The final question to cover is what the preferred communication channel should be in performing the municipalities risk assessment. We recommend developing a shared drive option in the methodology platform for sharing the different completed risk assessments among agencies and municipalities. For all other communications, the mailing lists and ad hoc queries supplemented by regional crisis committee in-person regular meetings should be sufficient.

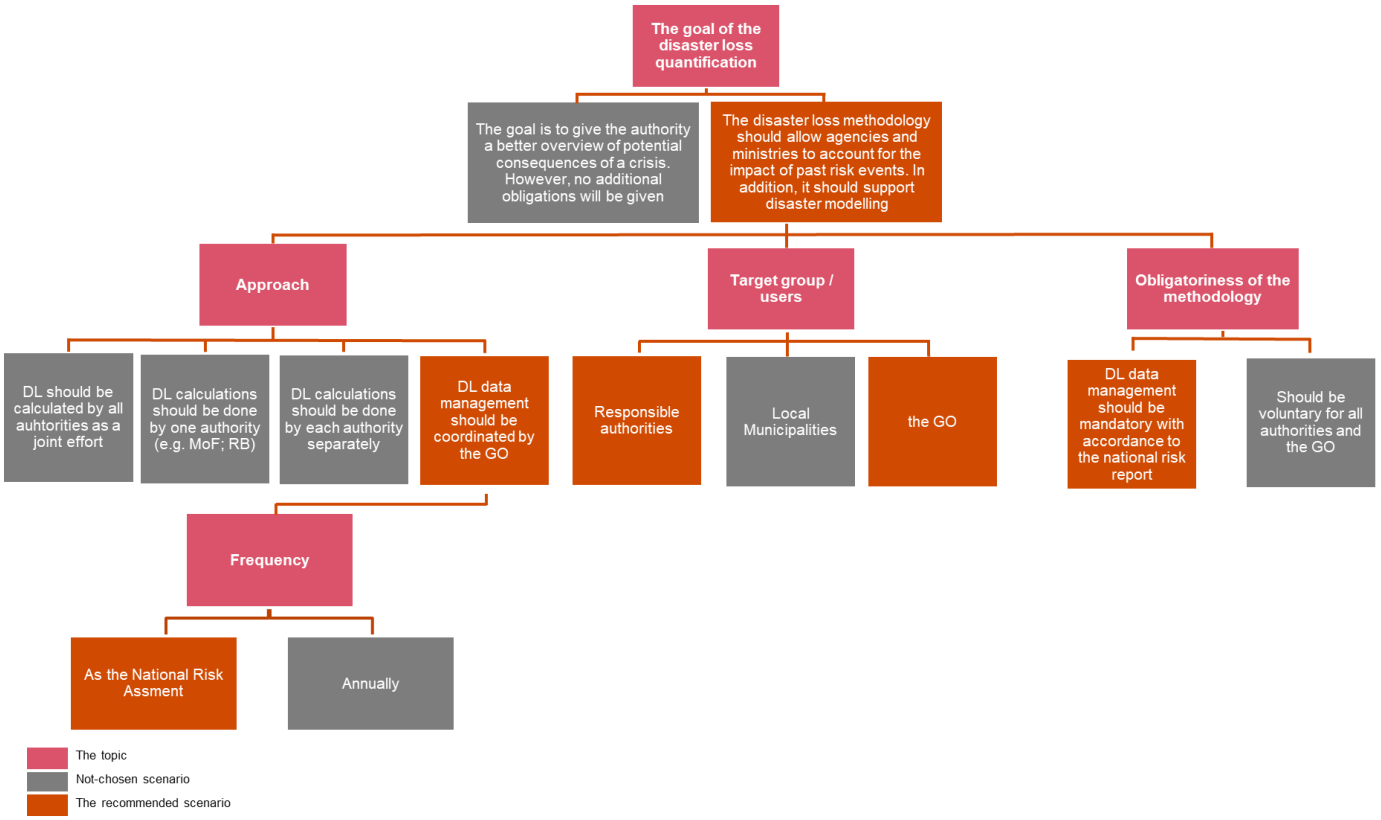
5.3 Recommendations for the national disaster loss methodology system

The considerations regarding the national disaster loss methodology may be divided into three categories: the overall approach, governance, and operational aspects. The following chapter will give a short overview of recommended to-be scenarios under each category.

5.3.1 Approach to disaster loss methodology

Regarding the approach to the national disaster loss methodology, there are 5 aspects to consider: the goal of the disaster loss methodology, users, obligatoriness, approach, and frequency. Different alternatives for each aspect are presented in a simplified decision tree format – see Figure 8 below. Our recommendation for each aspect is highlighted in an orange box.

Figure 8. Approach to DL management



Q1. The goal of the disaster loss quantification. The first consideration involves the overall goal and purpose of disaster loss methodology. It should clearly allow the authorities to carry out disaster loss accounting for past events as well as modelling the potential consequences of different risk scenarios in structured categories. This will make different risk scenarios comparable and will allow to set priorities. However, the result should not just be creating additional risk impact awareness – the outcome should become a critical input information to aid decision-makers in the Government and agencies to select the most efficient mitigation / preparedness measures and optimal investment targets.

Q2. Approach – although responsible agencies may benefit from disaster loss accounting and modelling as a part of their individual risk assessments and decision-making processes, to establish a society-wide view to disaster loss, information and expertise sharing is needed. Therefore, we recommend establishing expert working groups to assess the wider societal impacts and disaster loss of national crisis.

Q3. Target group / users – in terms of the users of the disaster loss methodology, we believe disaster risk modelling can be useful for different stakeholders who undertake a risk assessment, because it can serve as an impact quantification tool. However, the greatest positive impact of disaster loss accounting and modelling comes from the total society-wide view. This means that the main user should be the GO, who is responsible for the national risk assessment and has the mandate to bring together experts, know-how and information from different sectors. The responsible authorities will clearly play an important role in giving necessary input, but they are not in the position to grasp the overall cross-sectoral impacts on their own. We also considered establishing a separate team whose primary responsibility should be disaster loss management. On one hand this would allow them to specialize and may support efficiency, but at the same time has an increased potential for tunnel vision bias.

Q4. Obligatoriness of the disaster loss methodology. The prioritization and society-wide disaster loss accounting and modelling is possible only if all relevant authorities are engaged and the effort is shared. Therefore, we believe that there is a need to make this mandatory as a part of the national risk

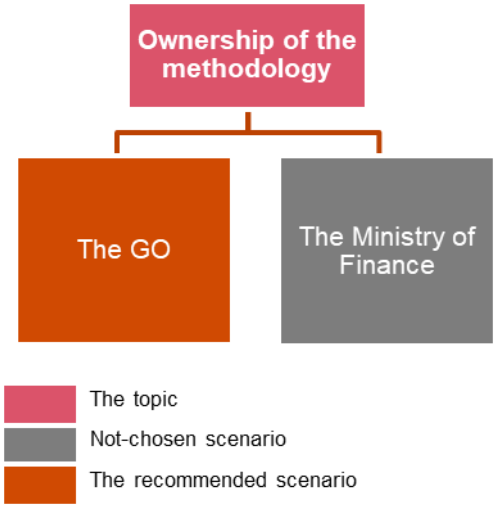
assessment process. If the implementation of the disaster loss methodology remains voluntary, it is likely that the stakeholders do not get access to all the relevant information and the loss accounting or modelling will not be complete.

Q5. Frequency. In our opinion, the assessment should be carried out as a component of the national risk assessment (once every ~4 years). Based on this assessment, priorities and investment plans can be made on a strategic level for multiple years.

5.3.2 Governance of disaster loss management

When it comes to governance of the disaster loss methodology, the aspect to consider is the methodology owner. Please see Figure 9 for alternatives considered.

Figure 9. Governance of DL management

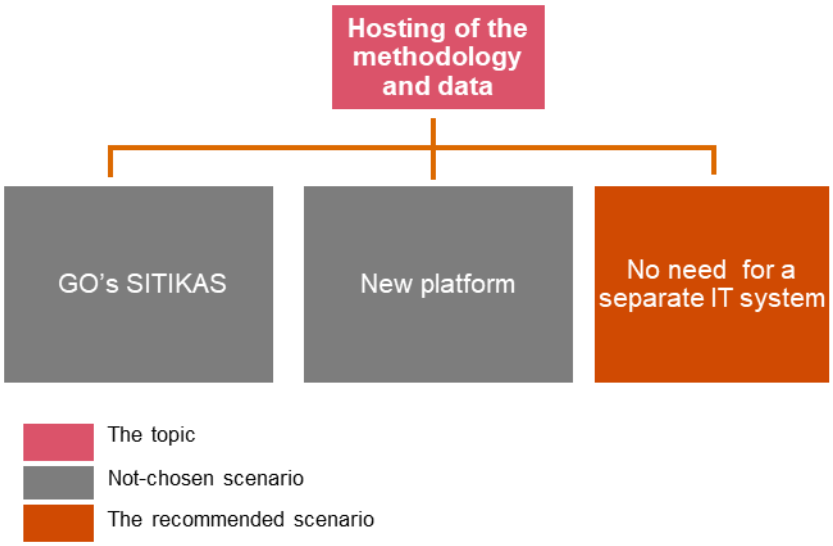


Q6. Ownership of the methodology. As we recommend linking the disaster loss methodology (for disaster modelling) with the national risk assessment exercise, we recommend the GO (as the coordinator of the national risk assessment) to be the owner of the methodology. They can delegate tasks to different institutions and gather sector-wide information for the society-wide view in the most optimal way. As the structural approach should be the same for disaster risk modelling and accounting, we also consider the GO to be the most suitable stakeholder to coordinate the accounting of state-wide disaster loss. The GO has the political mandate to assign the disaster loss accounting and define the approach for it.

5.3.3 Operational aspects of disaster loss methodology

In terms of operability of the disaster loss methodology the technical environment should also be considered. Please find Figure 10 for considerations. As we recommend establishing cooperation workshops for the disaster loss assessment and developing shared disaster loss assessments, further detailing of communication efforts would not be necessary.

Figure 10. Operational aspects of DL data management



Q7. Hosting of the methodology and data. Considering the current maturity level of the Estonian disaster loss data management, we do not consider it necessary (at least in the short term) to establish a centralized system for disaster loss data management. Preliminary benefits come from starting regular assessments in three categories and bringing the data and know-how together by involving sectoral experts in the working groups and establishing a shared approach and principles. The methodology itself will be available in the local municipality risk assessment tool. The impact of the crisis may be recorded in an excel file documented in a shared registry. From a proactive DL management perspective there are a limited number of users for the disaster loss data and all the necessary data inputs can be referred to in disaster loss reports based on sectoral data and information systems.

6 Appendices

Appendix 1. List of interviews and discussion groups

Organisation/event	Date of the interview	Interviewees
The Government Office of Estonia	06.05.2022	Galina Danilišina Triin Raag
The Government Office of Estonia	13.05.2022	Galina Danilišina Triin Raag
The Government Office of Estonia	20.05.2022	Galina Danilišina Triin Raag
The Government Office of Estonia	27.05.2022	Galina Danilišina Triin Raag Erik Ernits
Stakeholder workshop	23.05.2022	Representers of Tartu, Tallinn, Narva, Hiiumaa, RB, Ministry of the Interior, Ministry of Finance, MoE, MoEC,
The Government Office of Estonia	3.06.2022	Galina Danilišina Triin Raag Erik Ernits
The Government Office of Estonia	10.06.2022	Galina Danilišina Triin Raag Erik Ernits
The Government Office of Estonia	15.6.2022	Galina Danilišina Triin Raag
The Government Office of Estonia	17.06.2022	Galina Danilišina Triin Raag Erik Ernits

Appendix 2. Alternative functionalities analysis EST

Appendix 2 can be found separately from this file. It can be found in addition to this report, under an excel file named “Appendix 2. Alternative functionalities analysis EST.xlsx”

