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IMPROVING CRISIS COMMUNICATION MANAGEMENT AT THE LOCAL MUNICIPALITIES: AN E-SERVICE PROPOSAL

Master's thesis

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KRIISIKOMMUNIKATSIOONI JUHTIMISE TÄIUSTAMINE KOHALIKES OMAVALITSUSTES: E-TEENUSE ETTEPANEK

Magistritöö

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Tallinn 2023

Author’s declaration of originality

I hereby certify that I am the sole author of this thesis. All the used materials, references to the literature and the work of others have been referred to. This thesis has not been presented for examination anywhere else.

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Abstract

This research problem is to find a better e-solution for apartment associations and local municipalities to prepare for different crises. The main problem to solve is to get an overview of all the apartment associations in the district, and their needs, mapping all the vulnerable people in the district together with categorizing what are their living conditions and needs in the possible crises, getting direct contact with people, and together planning crisis plans and development.

During the research, to find a solution and answer questions, the author conducted a workshop with elderly local people, met with experts, analyzed different secondary data sources, and proposed a new e-service. The author evaluated the new e-service during the interview with the Estonian Rescue Board crisis management expert. The research looks into the Kristiine district case study, which is one of eight districts in Tallinn, the capital of Estonia. New e-service improves crisis preparation and communication management at the local municipalities.

This thesis is written in English and is 86 pages long, including 8 chapters, and 18 figures. Interviews and meetings were in Estonian, then later translated into English.

Keywords: local governments, apartment associations, crise management, e-services, emergency evacuation, ICT, technology readiness, crisis response, technology acceptance model, action design research.

Annotatsioon

Kriisikommunikatsiooni juhtimise täiustamine kohalikes omavalitsustes: e-teenuse ettepanek

Magistritöö uurimisprobleemiks on leida parem e-lahendus korteriühistutele ja kohalikele omavalitsustele erinevateks kriisideks valmistumiseks. Peamine probleem, mida lahendada, on saada ülevaade kõigist linnaosa korteriühistutest ja nende vajadustest, kaardistada kõik linnaosa abivajajad või haavatavas seisus inimesed koos kategoriseerimisega, millised on nende elutingimused ja vajadused võimalike kriiside korral, saada otsekontakt elanikega ning ühiselt koostada kriisiplaane ja planeerida arengut.

Uurimistöö käigus viis autor lahenduse leidmiseks ja küsimustele vastamiseks läbi töötoa kohalike eakate inimestega, kohtus ekspertidega, analüüsis erinevaid andmeallikaid ja kirjalikke viiteid ning pakkus välja uue e-teenuse. Autor hindas uut e-teenust intervjuus Päästeameti kriisireguleerimisekspertidega. Uurimistöö käsitleb näidisena Kristiine linnaosa juhtumi ja kriisireguleerimist. Kristiine on üks kaheksaks Tallinna linnaosast. Uus e-teenus parandab kohalikes omavalitsustes kriisideks valmistumist ja kommunikatsioonijuhtimist.

See lõputöö on kirjutatud inglise keeles ja on 86 lehekülge pikk, sealhulgas 8 peatükki ja 18 joonist. Intervjuud ja kohtumised olid eesti keeles, seejärel tõlgitud hiljem inglise keelde.

Märksõnad: omavalitsused, korteriühistud, kriisireguleerimine, e-teenused, hädaolukord, evakueerimine, IKT, tehnoloogiavalmidus, kriisireageerimine, tehnoloogia aktsepteerimise mudel, tegevusdisaini uuringud.

List of abbreviations and terms

ADR	Action Design Research
BIE	Building, intervention, evaluation
EBSCOhost	Online research platform
EHIS	Estonian Education Information System
EMPIS	Procedure system for the provision of labor market services and persons registered as unemployed and job seekers
ICT	Information and Communication Technology
IT	Information Technology
KIRST	Register of insured persons
LINE	Messenger and social media app in Japan
MKR	Register of Taxable Persons
RR	Population Register
SKAIS	Social Protection Information System
SMS	Short Message Service
STAR	Data Register of Social Services and Benefits
TalTech	Tallinn University of Technology
TEHIK	Health and Welfare Information Systems Center
TETRIS	The module for the assessment of work ability and the processing of work ability support
TÖR	Employment Register
XML	Extensible Markup Language
SNS	Social networking sites

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1 Introduction

1.1 Research Problem and Motivation

This research problem is to find a better e-solution for apartment associations and local municipalities to prepare for different crises. Unfortunately, surveys show that apartment associations are unprepared for crises. Successful crisis management on the municipality level means good cooperation between the local government and apartment associations, and there is no working platform or e-service for that today. “Today, 96% of apartments have been privatized. These privatized apartments are organized through apartment associations and housing co-operatives” (Eesti Korteriühistute Liit, 2023). Better cooperation is crucial and helps save lives in future crises. Therefore, the main problem to solve is to get an overview of all the apartment associations in the district, and their needs, mapping all the vulnerable people in the district together with categorizing what are their living conditions and needs in the possible crises, getting direct contact with people, and together planning crisis plans and development.

The primary aim of this master’s thesis is to improve crisis management and preparedness in the cities. In everyday work, the author works closely with apartment associations to improve citizens’ preparedness for crises. As covid-19 pandemic showed, in similar cases, local municipalities must react immediately, and before the next massive crisis, it is important to improve the existing situation. „Local government is an important segment that has the legitimacy to organize local public affairs. Whereas community is regarded mainly as a social philosophy pertaining to the domain of communitarianism. More broadly, a community is a unit that includes the social networking, beliefs, values, norms and the social cohesion between its members, who are considered as social capital and are identified as part of the community “ (Kamberi, 2021). Connecting community and local municipality has a vast potential.

Considering Estonian e-governance capabilities and well-developed e-services, it is necessary to improve digital cooperation between apartment associations and local

governments, use available databases, and create new e-services for apartment associations. E-services are widely supported and accepted by the citizens. Therefore, if the goals are clear, it is possible to design the new e-service to better cooperate with apartment associations and gain better crisis communications management in local municipalities to save lives. In Estonia, apartment associations have resources; they could be trained systematically and would be effective in working with people in crisis. Working systematically with older people, the most vulnerable society group in crises, is crucial. As one of the closest levels of the organization to citizens, apartment associations must have their role in crisis plans.

Evacuation is one topic of crisis management in the cities. The war in Ukraine has made all the organizations think more about the possibility of quickly evacuating many people from cities. It has transformed the valuation and thinking about possible crises. A new war conflict, radiation accident, flood, earthquake, unexpected weather conditions, etc. can cause an emergency evacuation crisis. The practice has shown that there is not enough human workforce for massive crises in municipalities, and the critical issue is how to improve IT- systems and use available technology or databases to save lives in emergency crises and provide people with the help they need. The latest events in the world have made this topic crucial and relevant.

Local governments work a lot with different crises and action plans. Cooperation with local people and apartment associations at every level is essential. Today, there are many free courses, financial support funds, and advisories for local apartment associations in different municipalities, but this research idea is to combine this work under one e-service. Still, the level and capability of apartment associations are very different; therefore, it is essential to find working solutions for better cooperation and crisis management. “There are 6000 apartment associations in Tallinn” (Tallinn Municipal Police Department, 2022). If we can find a universal e-service for better cooperation, it would help many people. Although work with apartment associations is ongoing, it is still not systematic from the point of view of crisis management. Therefore, it is necessary to make this work more guided and professional.

Moreover, it is not still clear which role and to what extent should have apartment associations. As they are voluntary organizations and, at the same time, the owners of the

property, then they should be motivated to be a part of the plan, to build up capabilities for various crises, and to be prepared to help themselves as much as it is possible. Apartment association work is mainly on voluntary bases, and it has a vast potential that is not used. Therefore, this work proposes to create a new e-service for apartment associations and local municipalities.

1.2 Research Questions

The objective of this master's thesis is to investigate how to improve digital cooperation between local governments and apartment associations to prepare for crises. For that purpose, it is crucial to understand which available databases could be used to help solve crises, how to share information and communicate with different counterparts, how to improve available e-services for apartment associations, and how to create a digital infrastructure that would guide the preparation for different crises and give an online overview of all the district. It is essential to rely on people's opinions who might be the victims of crises, meet their needs, and consider user experience.

During the research, to find a solution and answer questions, the author conducted a workshop with elderly local people, met with experts, analyzed different secondary data sources, and proposed a new e-service. The author evaluated the new e-service during the interview with the Estonian Rescue Board crisis management expert. The research looks into the Kristiine district case study, which is one of eight districts in Tallinn, the capital of Estonia.

The research answers the main question (RQ1) and then two sub-questions (SQ1, SQ2). Altogether, it is three questions. RQ1 relates to the proposal of the new e-service; the other sub-questions support the analyses.

RQ1. How to improve digital cooperation between local governments and apartment associations to prepare for crises?
SQ1. How to create a digital infrastructure that would guide the preparation for crises and give a full online overview of all the apartment associations in the district?

SQ2. How to share information and continue communication with older people in emergency crises?

This dissertation consists of eight chapters. In the introduction in Chapter 1, the author introduces the research question and the research aim. The research problem and motivation are described. In Chapter 2, the author overviews available literature describing the sector. In Chapter 3, the author gives an overview of the problem and describes the background of the issue, and it also gives a detailed overview of legislation and regulations in force in the area and apartment associations' problems today.

Moreover, all stakeholders are described, and an overview of existing crisis management tools and available state data registers is given. In Chapter 4, the author presents the overall research design and methodology. Section 4 describes the methodology used in this research to answer the RQ1 and then to SQ1 and SQ2 to achieve all the goals. Chapter 5 presents the research results, including workshop and meetings with experts. In Chapter 6 author presents the proposal of a new e-service for apartment associations and local municipalities, describing the user's competencies, e-service development stages, clod architecture model, and overview of the idea validation. In Chapter 7, the author gives future research directions and new crisis management and communications research areas. All the research is shortly summed up under Chapter 8.

2 Literature Review

The proposed e-service is new and is in an Estonian context. Therefore, no particular one-to-one work has been done previously, but there are many studies about crisis management, and similarities can be found. We can see parallels in cooperation with apartment associations in Finland and the Baltic states. The obstacles and goals are similar. In this work, the author used the TalTech Library Portal search and EBSCOhost search portal, using keywords like “Crises management in local municipalities,” “Crises management solutions,” “Apartment association and local municipality,” “Crises management,” and others. Search results were in English and from the years 2013 - 2023. This period gave a good overview of available solutions and research directions.

Lately, many practices can be taken from the covid-19 pandemic. Many mistakes were made in the analyses of covid-19 pandemic solutions, and obstacles evaluated can also be described and analyzed. The application “HOIA” was developed in Estonia to prevent the virus from spreading, but unfortunately, it was unsuccessful. As a professor of applied virology and member of the government’s COVID-19 scientific advisory council Andres Merits said that HOIA has failed to meet expectations. “Critical mass of users and user efficiency missed the mark,” Merits said, adding that he downloaded the app as soon as it was released, while it has now become another useless gadget in his smartphone. “80 percent of people I have met do not have the application installed” (Allik, 2021). Therefore, there are analyses to continue considering why some new solutions were successful, and others were not.

On the other hand, local municipalities were successful. As written, “local governments have remained resilient and capable, which is demonstrated in the municipalities' effective handling of the COVID-19 pandemic. These capacities derived from their expertise and investment in local public healthcare, the possession of databases and management structures based on close linkages with local communities “ (Hatchakorn Vongsayan, Viengrat Nethipo, 2021). Therefore, the author is confident that the subsequent crises successfully resolved bear on the shoulders of municipalities.

We must consider all the experiences from the latest crises to design new e-services. As said, “In disaster management ICTs as a tool play an important role having an overall positive impact, and are used in all the phases of a disaster” (Vasilis Kontogiannis, Dimitris Manousos, Ioannis Karatzanis, Panagiotis Argyropaidas, Angelina Kouroubali, 2017). ICT means usage for registration, sharing online information, communication, monitoring, individual services, crisis management, and other activities. We can even go further, using artificial intelligence or machine learning, so there must not always be human intervention. Now when we look at this master thesis’ context, then “In Estonia, 99% of public services are available online 24 hours a day” (e-Governance, 2023). This means it is a good space for different experiments, and we could benefit from the Estonian e-governance solutions, available state databases, and working X-road, adding civil societies' activism and participation. New e-services could be a model for other countries in the future. The need for such a tool is crucial.

Additionally, apartment associations’ role in crisis management is specific, and they have a role in civil society. Now it must be developed further. In Estonia, „Today, 96% of apartments have been privatized. These privatized apartments are organized through apartment associations and housing co-operatives" (Eesti Korteriühistute Liit, 2023). Moreover, “Apartment associations must also be ready for crises. In order to cope with crises as best as possible, every apartment association must have a plan for how to behave and what to do if water, district heating or electricity goes out at home” (Estonian Rescue Board, 2023). In crises management, “The relationship between citizens and authorities can be improved through e-government, and citizens are satisfied that they have access to all public information, thus increasing their involvement in the governance process” (Sorin Burlacu, Simona Roxana Patarlageanu, Amelia Diaconu, Ghenadie Ciobanu, 2021). In a crisis, all the available tools will be used, and online tools significantly impact sharing of information and official messages such as Facebook, Twitter, and others. The issue is to work out such an e-service, which improves preparedness and helps to monitor developments.

Although many active private companies already make significant steps in digitalizing apartment association’s services. Therefore, this research is proper to understand what we could do in crisis management. Also, it „will be useful for drawing up various government

programs that stimulate the processes of digitalization of service activities of management companies in the provision of housing and communal services“ (Taruta, 2022).

Also, there are many obstacles described to improve crisis management and preparation. The studies describe “many problems in various aspects of planning including: lack of coherent programs, lack of attention to the needs of health care, poor coordination between agencies and organizations and lack of appropriate training of volunteers and people” (Mahmood Nekoei-Moghadam, Mohammadreza Amiresmaili, Zeynab Aradoei, 2016). The framework of responsibilities, actions, and decision-making derives from the law, but the role of every organization’s voluntary work is fundamental. “Disasters occur when an incident exceeds nature and society’s ability to manage it. The increase in heavy rainfalls tends to overwhelm both structural and non-structural measures, and there is concern that this damage will only worsen in the future. Structural measures are indispensable, but it takes much time for them to be established. The measures that can be taken at an early stage are non-structural, and among them, raising people’s awareness of disaster management has to be improved. Thus, the realization of early eviction and evacuation to a safe place has become an urgent issue” (Takeyasu Suzuki, Takanori Watanabe, Shin’Ichiro Okuyama, 2019). Preparation for different crises must be regular everyday activity and a part of apartment management.

To maintain needed infrastructure and services, new technological gadgets can also use. The new era uses drones, blockchain, cloud-based services, decentralized solutions etc. For example, in Japan, “As a means of communication with district residents during disasters, LINE is used, which is one of the social networking services” (Takeyasu Suzuki, Takanori Watanabe, Shin’Ichiro Okuyama, 2019).

As mentioned, there is no working e-service for apartment associations and local municipalities. Therefore, this field is in development, and new solutions can be tested. The vital issue is a political will to develop new solutions and lawmakers to make all the rules for new digital solutions. An essential part of this work is citizens' opinion of needed e-services in crises. This work follows the Rescue Board and Tallinn city development plans. “Furthermore, municipalities across the world are still learning from recent episodes and there is a general need to explore new techniques and guidelines that could help to reduce vulnerability, and enhance the resilience, adaptive capacity, and

sustainability of urban environments, considering the already predicted future challenges associated with climate variability“ (Bert Bosseler, Mirko Salomon, Marco Schlüter, Matteo Rubinato, 2021). The new e-service will support different threats solutions.

On the other hand, everything must be analyzed in real life context. In some cases, the preparation for crises depends on the living standard. It would be interesting to analyze “whether the national minimum standard was satisfied in terms of the infrastructure for basic life in the district” (Wooseok Kang, Narang Park, Wookjae Heo, 2021), and what are their conditions in the context of crises management. This research workshop with older people was held, and it gave a detailed overview of the situation. Workshop focused on older people, as this age group needs the most assistance and extra help in crises.

3 Background

In this work, the author proposes to create a new e-service for apartment associations and local governments, based on the case study of Kristiine district, developed in Tallinn city, as a tool to share information, prepare for crises, and get an online overview of the city`s district. It would also answer how to help the most vulnerable people in crises. “Consumer technology has been enormously boosted by the COVID-19 pandemic, with one of the primary consumers being the elderly. In this scenario, it is necessary to consider the impact of technologies on different older generational cohorts to understand the future of a data-driven digital society fully” (Patricio Ramirez-Correa, Elizabeth Eliana Grandon, Muriel Ramirez-Santana,Jorge Arenas-Gaitan, F. Javier Rondan-Cataluna, 2023).

The number of people over 65 in the world is growing. “The population aged 60 or above is growing at a rate of about 3 per cent per year. Currently, Europe has the greatest percentage of population aged 60 or over (25 per cent). Rapid ageing will occur in other parts of the world as well, so that by 2050 all regions of the world except Africa will have nearly a quarter or more of their populations at ages 60 and above. The number of older persons in the world is projected to be 1.4 billion in 2030 and 2.1 billion in 2050, and could rise to 3.1 billion in 2100. Over the next few decades, a further increase in the population of older persons is almost inevitable, given the size of the cohorts born in recent decades” (United Nations, 2023). As a part of this research, a workshop with the elderly from the Kristiine district was organized. The workshop showed that the elderly are ready to be active and voluntarily share information with others in their area, even in a crisis.

As people get older, live longer, and more and more people live alone, the elderly usage of social networking sites is still a huge question. “On the one hand, companies could create diverse marketing strategies to target elders according to the segments they belong to. For example, for the independent elder segment, the fun or pleasure derived from using SNS may not impact its intention to use it” (Patricio E. Ramírez-Correa, Jorge Arenas-Gaitán, F. Javier Rondán-Cataluña, Elizabeth E. Grandon, Muriel Ramírez-Santana, 2023).

Also, the elderly are active in apartment associations and probably need the most help in an emergency evacuation. Therefore, if we can advise and educate these organizations, they can probably manage themselves in crisis without much extra help. “In a crisis situation, the state will be able to reach everyone living in Estonia within seven days. In a crisis it is very important that you are well prepared for it − that you have enough of everything you will need at home and that you have discussed potential plans of action with your family and neighbors. One of the basis this is so notable is that it ensures that help will also reach those who are unable to help themselves in a crisis situation, and reach them in time. As such, we urge you to read all of the recommendations set out on the following pages with your family and to keep these guidelines somewhere everyone can find them. Safety and security start with you” (Estonian Rescue Board, 2023). Therefore, the state will not be able to help everyone immediately and help bear on the apartment association`s preparedness to manage various crises and, if needed, evacuate themselves. This is extremely important. At the same time, in a crisis, it is crucial that all public organizations continue their work, be prepared to act and respond in an emergency, and concentrate all their available resources to solve the situation, focusing on saving people’s lives.

Older people are most vulnerable due to their age, health condition, lack of social circle, networking and communication, information technology skills, and readiness to use modern technology. This research workshop with older people helped to understand how to share information with them in an emergency evacuation crisis. “Regardless of the reasons why the evacuation is carried out, it is important that involved in the evacuation would understand what extensive evacuation means, who is organizing a large-scale evacuation and what is someone's tasks in the event of a large-scale evacuation” (Siseministeerium, 2017). Emergency evacuation can be the last step in a crisis, but apartment associations also must consider this possibility. It can happen. The emergency evacuation process in practice is still under development and depends mainly on the nature of the crisis.

Although the first thoughts came from the workshop with the elderly, the idea for the new e-service developed on a much larger scale.

This research describes how decisions are made, information shared, and which local government departments do what part of the process. Although, according to the Emergency Act, mass evacuation is carried out by the Rescue Board, local governments still have a considerable role in managing and helping with the evacuation.

The huge question is how to build a network to help solve the crises, quickly share information, and help other counterparts act according to the coordinated plan. There is considerable potential in networking with apartment associations, who know all the people in their houses, and would voluntarily be a part of the crisis plan in the future. “In disaster management ICTs as a tool play an important role having an overall positive impact and are used in all the phases of a disaster” (Vasilis Kontogiannis, Dimitris Manousos, Ioannis Karatzanis, Panagiotis Argyropaidas, Angelina Kouroubali, 2017). There is no working crisis preparedness and communication solution today for apartment associations, although the need exists. Therefore, creating a new e-service for apartment associations is necessary, which could support voluntary activity.

The latest covid-19 crisis showed that local governments and municipalities have a massive role in crisis management. Although the covid-19 crisis was managed and regulated at the state level, most of the actions, communication, and advice were done at the local government’s level. At the beginning of the crisis, people first called or sent letters to local municipalities to get guided information. So, apartment associations get most of the help from municipalities and are at the closest organizational level to the regular citizens. This has made local governments think more about their role and ability to solve different crises in the future. There is much communication and work between municipalities and apartment associations in everyday life, and, logically, something that already works today can work in an extraordinary situation.

Emergency evacuation solutions must be worked out in cooperation between local municipalities, apartment associations, and Rescue Board. The main question is, “how roles and responsibilities are divided up between you (as a resident) and your apartment association or community“ (Estonian Rescue Board, 2023) in a crisis, so you already know „what options you have to prepare for a crisis; and how well prepared your neighbors are for a crisis“ (Estonian Rescue Board, 2023). Key issues are cooperation and communication. The e-service for apartment associations will focus on crisis preparation,

but this service will continue to work during the crisis. It will help local governments and apartment associations to get an online overview of the situation in their territory and plan together how to achieve better preparedness.

Tallinn and Estonia are highly digital and have many popular e-services—successful solutions of a new e-service bear on the technological readiness of organizations. For example, in Norway, “In the studied municipality, integration of technological solutions into healthcare services was more a vision than a reality because of a low level of organisational readiness“ (Martha Therese Gjestsen, Siri Wiig, Ingelin Testad, 2017).

On the other hand, the design of the new e-service must consider the threat that the new service will not be accepted, as mentioned “The amount of acceptance literature stands in sharp contrast to the persistently low adoption rates of public e-services in most European countries” (Distel, 2020). It is a risk that must be considered. Regarding the quality of different e-services, the picture is very different. For example, “the quality of public e-services regarding labour market services in each European country varies greatly “ (Markko Liutkevičius, Sadok Ben Yahia, 2022). The goal is to create a new e-service of the highest level, quality, and widely used and accepted by the citizens.

3.1 Legislation

To design and plan a new e-service, it is crucial to get an overview of legislation that impacts the field and is the foundation for planning the service. In this research, three important acts regulate the field: Local Government Organization Act, Emergency Act, and Apartment Associations Act.

According to Local Government Organization Act, “Local government is the right, authority and duty of the democratically formed bodies of power of a local government provided for in the Constitution, a rural municipality or city, to independently organise and manage local issues pursuant to law and based on the legitimate needs and interests

of the residents of the rural municipality or city, and considering the specific development of the rural municipality or city“ (Local Government Organisation Act, 2023).

Estonian Emergency “Act provides for the legal bases for crisis management, including preparing for and resolving an emergency as well as ensuring the continuity of vital services” (Emergency Act, 2017).

As stated in Act, “an emergency is an event or a chain of events or an interruption of a vital service which endangers the life or health of many people, causes major proprietary damage, major environmental damage or severe 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” (Emergency Act, 2017). People in Estonia use e-services every day, some of these services are crucial, therefore “vital service is 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. A vital service is regarded in its entirety together with a building, piece of equipment, staff, reserves, and other similar facilities indispensable to the operation of the vital service” (Emergency Act, 2017). The interruption of internet access or e-services significantly impacts Tallinn's citizens because people are used to using them every day.

“For the purposes of this Act, crisis management is a system of measures which includes preventing, preparing for and resolving an emergency “ (Emergency Act, 2017) and “in preventing, preparing for and resolving emergencies, authorities and persons shall cooperate and assist one another” (Emergency Act, 2017). This is very important to understand the importance of cooperation and start to build up a service that supports cooperation.

In every crisis, communication must be clear, fluent, and understandable to all citizens. As said, “Risk communication is organised for raising public awareness and increasing readiness for emergencies” (Emergency Act, 2017). Now, when focus on events, which could cause emergency evacuation then it is important to underline that according to “Act

mass evacuation means the temporary relocation of people from the endangered area to a safe location in the event of an emergency“ (Emergency Act, 2017). „Preparing for and carrying out mass evacuation are organised by the Rescue Board. The Police and Border Guard Board participates in carrying out mass evacuation “ (Emergency Act, 2017), and „The local authority assists in the evacuation of persons and in providing accommodation and food for the evacuees“ (Emergency Act, 2017). If the apartment associations are prepared for evacuation and have reserves and capabilities, the local municipality can concentrate on the people who need the most help.

According to the act paragraph 41, “ensuring electronic security of provision of vital service”, under section 1 is said “A provider of a vital service is required to ensure the constant application of security measures in regard to the information systems used for the provision of the vital service and the related information assets” (Emergency Act, 2017) and under section 2 is said “If information systems ensuring the operation of a vital service are located in a foreign country, the provider of the vital service is also required to ensure the continuity of the vital service in a manner and by means not dependent on information systems located in foreign countries” (Emergency Act, 2017). This issue can be a part of the following research: how to build up capabilities that ensure internet access and communication without interruption.

All apartment buildings have apartment associations. „An apartment association is a non-profit association established by apartment owners provided for in the Apartment Ownership Act for the purpose of shared management of the legal shares of the buildings and plot of land which are part of the object of apartment ownership and representation of the shared interests of the members of the apartment association“ (Apartment Associations Act, 1995) and “all apartment owners of an immovable or immovables divided into apartment ownerships are members of the apartment association if the resolution to form an apartment association is made pursuant to the procedure provided for in this Act. Other persons shall not be members of the apartment association” (Apartment Associations Act, 1995). It needs legal analyses of how many obligations can be put to apartment associations in creating a new e-service and to what extent they should be responsible for the people who live in their houses. If we could create a unique role for apartment associations, that would mean taking the first steps to saving their older people -it would save a lot of time and workforce. This is the closest organized level to

citizens, the following closest would-be family members. In sum, apartment associations have resources, could be trained systematically, and would effectively work with people in crisis.

“Residents are responsible for doing everything they can to cope in any situation. These guidelines will be of help in that regard“ (Estonian Rescue Board, 2023). When we focus on just evacuation, it can be divided into different parts, such as threat happening, communication, people leaving their homes, gathering at public transportation points, evacuation transportation, and, after the crisis ends, returning home. Evacuation can be spontaneous, recommended, or compulsory. Also, it can be complete or partial evacuation. This all depends on the crisis event.

In sum, legislation relates to political will and decision-making. If the state’s government sees the need to create such a service, then all the legislative changes can be done.

List and references of law documents in force now that regulate crises management on the state level:

- Emergency Law[1]
- Chemicals Act[2]
- Rescue Act[3]
- Construction Law[4]
- National Defense Act[5]
- Motor Vehicle Act[6]
- Requirements for the conduct of the crisis management exercise and the organization of the exercise[7]

[1] https://www.riigiteataja.ee/akt/122052018005?leiaKehtiv

[2] https://www.riigiteataja.ee/akt/110112015002?leiaKehtiv

[3] https://www.riigiteataja.ee/akt/128122017053?leiaKehtiv

[4] https://www.riigiteataja.ee/akt/119032019099?leiaKehtiv

[5] https://www.riigiteataja.ee/akt/113032019147?leiaKehtiv

[6] https://www.riigiteataja.ee/akt/126062018023?leiaKehtiv

[7] https://www.riigiteataja.ee/akt/131072021003

- The requirements of the vital service continuity risk analysis and plan, the requirements and procedure for their preparation and implementation of the plan[1]

Regulations of the Government of the Republic:

- Requirements and procedures for the management of emergency resolution, cooperation between institutions and persons participating in the resolution, public information and information exchange between agencies, and large-scale evacuation[2]
- The procedure for calculating and paying compensation for forced expropriation and forced use of things during a state of emergency[3]
- The procedure for the involvement of the Defense Forces and the Police of the Defense League in the performance of tasks, in the resolution of a rescue incident, and the performance of emergency work[4]
- Cooperation procedure of state and local government institutions and persons participating in the rescue event[5]
- A list of events that may cause an emergency, for which a plan for their resolution is drawn up, the requirements and procedure for drawing up the plan, the authorities leading its preparation, the bodies of the executive state power leading the resolution of the emergency, a list of emergencies for which risk communication is organized, and the authorities responsible for its organization[6]
- Requirements for the conduct of the crisis management exercise and the organization of the exercise[7]
- The requirements of the vital service continuity risk analysis and plan, the requirements and procedure for their preparation and implementation of the plan[8]

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[1] https://www.riigiteataja.ee/akt/131072021002

[2] https://www.riigiteataja.ee/akt/128062017039?leiaKehtiv

[3] https://www.riigiteataja.ee/akt/128062017036

[4] https://www.riigiteataja.ee/akt/128062017050

[5] https://www.riigiteataja.ee/akt/129122015016?leiaKehtiv

[6] https://www.riigiteataja.ee/akt/131072021005

[7] https://www.riigiteataja.ee/akt/131072021003

[8] https://www.riigiteataja.ee/akt/131072021002

3.2 Overview of apartment associations in Tallinn City

This chapter overviews apartment associations' interaction with the Tallinn central municipality. Kristiine District Administration is in everyday cooperation with Tallinn Municipal Police Department, which helps to plan different actions.

The latest data and opinions about apartment associations in Tallinn City can get from Tallinn Municipal Police Department, which is responsible for crisis management in Tallinn. Lately, Tallinn Municipal Police Department did a survey that focused on apartment associations. The survey took place between September to November 2022. "Survey's goal was to gain knowledge on what extend the 6,000 apartment associations of the city of Tallinn are aware of which vital services may be interrupted, and do they have preventive measures in place and an action plan" (Tallinn Municipal Police Department, 2022). The report of the questionnaire helps to think through and plan actions in crises management, so that the residents and apartment associations can better cope in the crisis. The answers to the questions are also useful for planning a tool for the city, so that it can better help residents, develop action plans, and better solutions to help apartment associations (Tallinn City, 2022). The questionary was sent to apartment associations via email.

All managers or members of the board of the apartment association of the city of Tallinn and residents of apartment buildings were invited to answer the survey. The questionnaire was in Estonian and Russian (Tallinn City, 2022). All the answers were in an online database.

Six hundred ninety-four apartment associations sent answers, and "when evaluating the results of the survey, the results of 423 respondents were considered. The most active responses came from the Põhja-Tallinn district (119 - 28.1%), followed by Lasnamäe (94 - 22.2%) and Nõmme (56 - 13.2%)" (Tallinn Municipal Police Department, 2022). Twenty-two answers came from Kristiine district. Answering was voluntary, so the activity rate was about 11%. These answers were not considered, with mistakes or not fully answered.

In sum, Tallinn Municipal Police Department 2022. survey results are:

- Managers of the apartment associations consider the probability that electricity (99.3%), water, and sewerage (95%) can be interrupted.
- 44% of respondents do not know how to get information about an interruption of a vital service.
- 80% of the responded cooperatives have not yet mapped which alternative solutions can alleviate the power outage and which devices must be equipped with backup power in the building.
- 90.5% of the respondents have not considered or purchased an alternative heating system for the building today. Managers do not know how long and whether the district's heating will work in a crisis (65%).
- 76% of managers still have not thought about how to cope with the lack of water and sewage not working.
- 86% of the cooperative managers have not discussed the organization of evacuation with the residents of the apartment building.
- 76.5% of the respondents have a cellar in the house, but there are no conditions for shelter. There are no action plans and preventive actions to ensure preparedness.
- Almost 80% of the responding managers also have the contact details of the residents.
- The board members are unaware today of where to get information on how long the services will continue to work in the city in crisis.
- Apartment associations need additional counseling and instructions, such as creating crisis action plans (Tallinn Municipal Police Department, 2022).

These answers illustrate well the situation with apartment associations in Tallinn City and why we need new e-services to help them develop and prepare for crises. The questionnaire was mostly answered by the people who were more motivated and active in apartment associations, and still, results show apparent problems in preparation and capabilities.

In addition, the author presents, under Chapter 5.1, the results of the workshop with the elderly from district Kristiine. It shows pretty same trends but adds a technical side and social activity.

In conclusion, based on the conducted research, it is possible to say that there is a need for a new e-service for apartment associations to improve cooperation between local governments and apartment associations.

3.3 Stakeholders

In this research, the author focuses on different stakeholders and their roles in crisis management. This section describes the duties and obligations of local governments, apartment associations, and the Rescue Board

3.3.1 Local government

According to Local Government Organisation Act, "Local government is the right, authority and duty of the democratically formed bodies of power of a local government provided for in the Constitution, a rural municipality or city, to independently organise and manage local issues pursuant to law and based on the legitimate needs and interests of the residents of the rural municipality or city, and considering the specific development of the rural municipality or city" (Local Government Organisation Act, 2023).

In this research, we focus on the case study of Kristiine District in Tallinn City. Therefore, next, it is described the case of Tallinn City.

In the city of Tallinn, there is the Tallinn Crisis Committee, which "is a permanent committee of the Tallinn City Government. The purpose of the committee is to coordinate crisis management activities in the administrative territory of the city and, if necessary, to assist in an emergency solving authorities and emergency manager" (Irve, 2023). If a crisis happens, Tallinn City's Crisis Committee gathers and activates crisis plans.

In short, the local government's crisis management team's (as Tallinn Crisis Committee) main objectives are readiness to solve a crisis or emergency, solving an emergency caused by a vital service with extensive or severe consequences management, making decisions, analyzing and resolving the event that caused the crisis or emergency, coordination of cooperation in a crisis or emergency and organization of information exchange between those concerned with authorities and involvement of necessary resources to solve crisis or emergencies (Irve, 2023).

As a role in general, local governments provide support in emergency evacuation, sheltering, and communication to local people. "Local government is responsible for ensuring that its water supply, sewerage, and district heating systems are functioning and that its roads are passable. It also supports people with a range of social services" (Estonian Rescue Board, 2023). These are different roles but, in general, relate to apartment associations.

For local governments, some tasks must be ensured in any situation: for example, the local government ensures the organization of vital services, such as water supply, sewage, district heating, and road maintenance (Triin Raag, Galina Danilišina, 2023).

Tasks that need to be continued in a crisis: organizing a 24-hour general care service outside the home for clients, organizing a substitute care service, organizing a shelter service, organizing an asylum service, ensuring unavoidable social assistance, organizing the payment of living allowance and ensuring the availability of childcare, primary and basic education (Triin Raag, Galina Danilišina, 2023). In this list, different agencies from the city are responsible for the tasks.

Local governments are supporting state functions in crisis. "The costs of contributing to large-scale evacuation as a national task are covered from the state budget" (Triin Raag, Galina Danilišina, 2023). By support functions, it is meant "Determining evacuation places in the territory of a local government unit, assisting in the large-scale evacuation of persons staying in the administrative territory of a local government unit, another local assisting in the reception of evacuated persons from the territory of the municipality and providing at least food to the evacuated persons in the evacuation places" (Triin Raag,

Galina Danilišina, 2023). Moreover, local governments advise rescue agencies about local conditions. This is directly connected with the apartment associations.

As a case study, this research analyzes how to build a new e-service for Tallinn City and Kristiine District Administration. To get the complete overview of the organizational side and better understanding of working mechanisms, it is presented the structure model of the district administration.

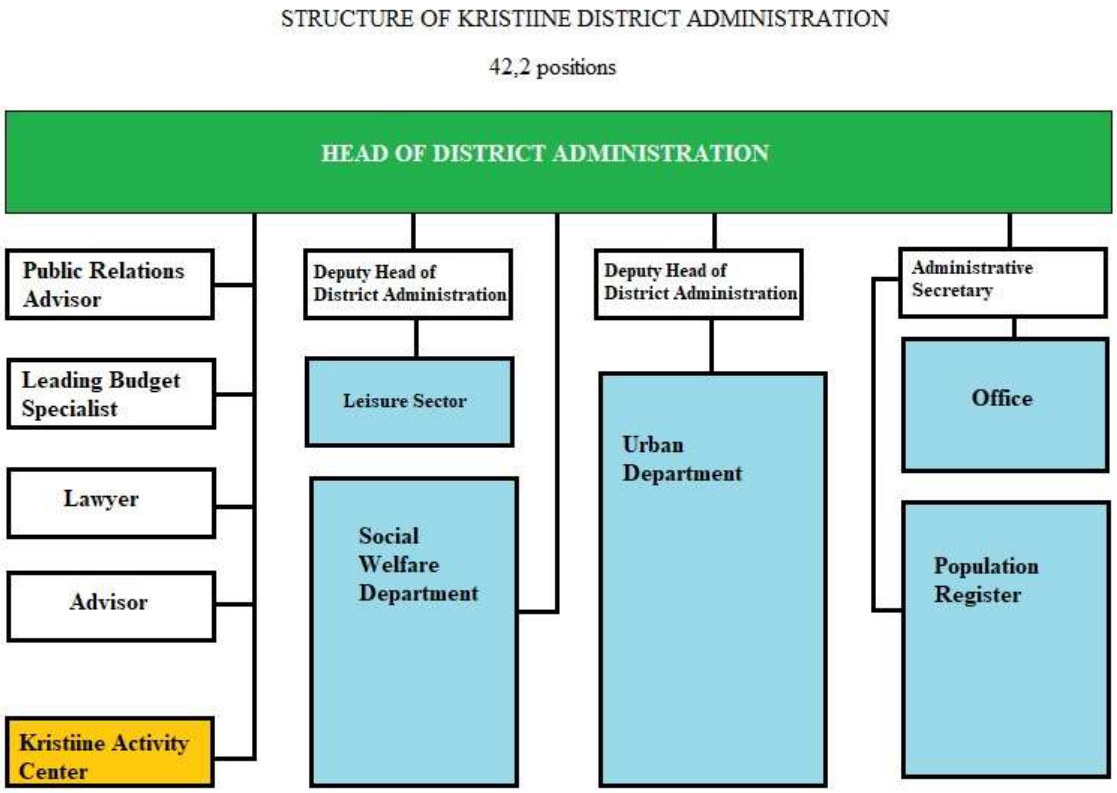


Figure 1: Structure of Kristiine District Administration[1]

3.3.2 The Rescue Board

In crises, the state is in the lead and makes decisions. Practice shows that a successful resolution of the crisis is in cooperation. In short, „the state is responsible for ensuring the availability of power, communications, fuel, cash, food and other basic necessities“ (Estonian Rescue Board, 2023). The Rescue Board's roles are consultation, cooperation

[1] Structure in Estonian: www.tallinn.ee/kristiine

between executive state authorities and local governments and organizing information exchange, managing regional crisis committees, preparing for shelter, and conducting it, preparing for large-scale evacuation, and conducting it (Triin Raag, Galina Danilišina, 2023).

3.3.3 Apartment Association

"An apartment association is a non-profit association established by apartment owners provided for in the Apartment Ownership Act for the purpose of shared management of the legal shares of the buildings and plot of land which are part of the object of apartment ownership and representation of the shared interests of the members of the apartment association" (Apartment Associations Act, 1995). In sum, "there are 6000 apartment associations in Tallinn" (Tallinn Municipal Police Department, 2022). They should have a considerable role in crisis management, but their role is unclear.

According to the Union of Apartment Associations, the critical characteristics of the Estonian housing co-operatives or apartment associations are: (1) formed to manage the common areas, (2) non-profit organizations managed by a board of directors, the board can hire real-estate manager if needed, (3) units belong to the individual members, (4) sale of units is regulated at the market, (5) owners pay according to the actual costs, (6) at the beginning of privatization, one housing co-operative had to be established for each building, but the rule was changed and apartment associations and housing co-operatives can have many buildings, (7) units built during the Soviet era (1960s to 1980s) are of poor quality and have high energy costs (30% more than compared to other European countries). The portfolio is in need of major renovation (Eesti Korteriühistute Liit, 2023). Therefore, the huge question is how to motivate property owners to invest more to better prepare for crises. In this research, it is brought out that it can either be a new law regulation or to make e-service in cooperation with the local municipality.

3.4 Regulations

Different levels of legislation and regulations affect the field of crisis management. The following is a more specific overview of the applicable legislation in Tallinn. In Chapter

3.1. the general legislation that directly affects the creation of a new e-service was described, but this chapter focuses on the regulations in force at the local government level. As Tallinn City and Kristiine District Administration were taken as a case study, all the regulations in force are now listed below.

In Tallinn City, different regulations coordinate crisis management; some are for internal use only. The list of active regulations in force now:

Regulation of the Tallinn City Council:

- Descriptions and operational requirements of vital services organized by the city of Tallinn[1]

This regulation gives information and requirements on how to organize vital services in the city. "A vital service is a service that has an overwhelming impact on the functioning of society and the interruption of which" (Emergency Act, 2017) directly threatens the life or health of people or the functioning "of another vital service or service of general interest" (Emergency Act, 2017). Vital services are the supply of electricity, natural gas, liquid fuel, district heating and water, ensuring the drivability of roads, mobile, landline telephone and data communication services, sewerage, electronic identification and digital signature, payment service and cash circulation" (Ministry of the Interior, 2023).

Regulations of the Tallinn City Government:

- The formation of the Tallinn Crisis Committee and the committee's statute[2]
- Restricting the traffic of vehicles with dangerous goods in the city of Tallinn[3]
- Traffic routes of N2 and N3 category motor vehicles in the city of Tallinn[4]
- Orders of the Tallinn City Government.

[1] https://www.riigiteataja.ee/akt/431012019048

[2] https://www.riigiteataja.ee/akt/429052019072?leiaKehtiv

[3] https://oigusaktid.tallinn.ee/?id=3001&aktid=102749&fd=1&leht=1&q_sort=elex_akt.akt_vkp

[4] https://oigusaktid.tallinn.ee/?id=3001&aktid=113850&fd=1&leht=1&q_sort=elex_akt.akt_vkp

These regulations give information on how the Tallinn Crisis Committee is organized and, how it works, what are the orders of the Tallinn City Government. Additionally, there is information about traffic restrictions, dangerous goods transportation, traffic routes etc. They carry essential aspects and instructions in terms of crisis management.

3.5 Existing Crisis Management Tools

There is no existing e-service solution today as it is proposed in this research, but some parallels can be taken from current solutions and tools.

Firstly, different public sources of information give guidelines on what to do and how to prepare for crises. For example, in Estonia, there is an application “Ole valmis!” (or “Be Prepared!” in English), which gives general information about different threads and how to act, and “there have been more than 12,000 downloads, 95 percent of them have been made in Estonia. There are also users of the application in, for example, Finland, Norway, Russia, Germany, Belgium, the USA, and many other countries “ (Jakson, 2019). Also, there is an official website in Estonian, Russian, and English: https://www.olevalmis.ee/

Website and application give “guidelines of the Rescue Board on what to do in the event of an emergency or crisis. They are designed to help you and your family cope when faced with unexpected and potentially dangerous situations“ (Estonian Rescue Board, 2023).

Secondly, different ways exist to inform citizens about threads and give instructions. Some of them are still in the development process. Therefore, „when instructed to do so, all media channels and mobile operators are obliged to transmit emergency warnings and guidelines to the public. The channels that will be broadcasting official information in a crisis in Estonia are those of the national broadcaster (err.ee, Vikerraadio, Raadio 4, ETV and ETV+), but other channels may also be doing so “ (Estonian Rescue Board, 2023). This means that when a crisis starts, then probably most of citizens get information, but it does not guide how to prepare for crises. “In addition to a military threat, sheltering may be necessary in extreme weather conditions or large-scale air pollution. The danger

notification is transmitted as a message via EE-ALARM and Estonian National Broadcasting and other media channels and with sirens installed in major cities." (Raag, 2023).

In sum, there is no e-service coordinating cooperation between local governments and apartment associations.

3.6 Overview and Description of Data Registers

Considering the research problem and benefitting from e-Estonia, different state`s e-registers can be used to create new e-services. All these registers use X-road to exchange data. X-Road is "an open-source software and ecosystem solution that provides unified and secure data exchange between private and public sector organizations, is the backbone of e-Estonia. Invisible yet crucial, it allows the nation's various public and private sector e-service information systems to link up and function in harmony" (e-estonia.com, 2023). This section analyzes and discusses which data e-registers can be used to create new e-services and which data is helpful in the context of this research.

3.6.1 STAR Register

STAR is a data register of social services and benefits. Local government's social workers use it in everyday work as an electronic environment.

The definition of STAR Register "is an electronic work environment for social work professionals to organize and document the work they do with clients (to assign benefits, services and manage cases, adoption and guardianship arrangements)" (Sotsiaalkindlustusamet, 2023).

Register performs information procurement requests to other national databases and collects all the necessary information about clients, such as:

- Population register (RR).
- Social protection information system (SKAIS).

- Information systems of the Unemployment Insurance Fund: Procedure system for the provision of labor market services and persons registered as unemployed and job seekers (EMPIS) and the module for the assessment of work ability and the processing of work ability support (TETRIS).
- Information system of the Health Insurance Fund: Register of insured persons (KIRST).
- Register of Taxable Persons (MKR) of the Tax and Customs Board.
- History of childhood court decisions.
- Employment register (TÖR).
- Estonian Education Information System (EHIS).
- Traffic register.
- Real estate book (Sotsiaalkindlustusamet, 2023).

For social service providers, STAR is an electronic channel for exchanging information and managing affairs with local governments, which directs people to receive services. Through the register, social service providers can obtain information about the persons referred to the service and can forward to local governments their reports on the provision of services (Sotsiaalkindlustusamet, 2023). Through STAR e-service, it is possible to quickly get all the available information about clients and check the information. It helps to decide on the same quality level, improves transparency, and helps to make supervision. In short, "STAR functions as a single electronic file, where the data of the person in need of help and the actions performed with him, like the support and services assigned to him, the meetings and counseling conducted, etc., are gathered. Through the data exchange platform X-Road, STAR communicates with many other information systems, thus reducing the burden on people to gather different information from different authorities. STAR data is used by three national registries, and STAR itself uses data collected by eleven agencies" (tehik.ee, 2023). The agreed working hours are from Monday to Friday from 8:00 a.m. to 7:00 p.m. During non-working hours, the host of the system has the right to perform maintenance work and other necessary actions, therefore the availability of the service is not always guaranteed during this time (Sotsiaalkindlustusamet, 2023).

The central users of the register are social officers and child protection workers of local governments, child protection and supervision workers of the Social Insurance Board,

social service providers and Health and Welfare Information Systems Center (TEHIK) (Sotsiaalkindlustusamet, 2023).

Case work network members (for example school social worker, family doctor, etc.) generally do not have access to STAR, but through STAR the case manager can assign tasks to network members with the necessary background information. Data is exchanged with other agencies (for example Social Insurance Board, Unemployment Fund) via the X-road (Sotsiaalkindlustusamet, 2023).

Register user rights are granted on a role-based basis, the rights of the register user are limited to the tasks and authorizations arising from his/her position, in order to ensure the proper processing of data in the register and the protection of personal data entered and contained in the register, including special types of personal data (Sotsiaalkindlustusamet, 2023). The task of the user of the register is to ensure that the quality of the data entered the database is as high as possible, that the security of the data is guaranteed, and that the data is processed legally (Sotsiaalkindlustusamet, 2023).

There are strict rules for using STAR register:

- STAR is for professional use only, making inquiries for personal purposes is prohibited.
- STAR must not be used in an unsecured Wi-Fi hotspot.
- STAR may only be used on the premises and on the hardware (workplace computer) designated for this purpose. Otherwise, secure data processing is not guaranteed (e.g., access by outsiders, lack of adequate anti-virus protection, etc.).
- Entering the system using another user's account is prohibited.
- When leaving the desktop, you must either log out of the system or lock the screen.
- Printouts containing personal data from the system must not be left in a place accessible to outsiders.
- Unauthorized persons must not have access to files generated from the system.
- It must be encrypted if there is a need to transmit personal data via e-mail.
- Personal data is transmitted to third parties only if there is a legal basis (Sotsiaalkindlustusamet, 2023).

In an emergency crisis, Kristiine District Welfare Department would request data from the STAR database to get the client's name, address, contact, and other information. The most important are contacts; the first step would be to send out information via e-mail, SMS, or phone call. The risk is electricity; data requests cannot be made without electricity. Therefore, local governments are investing in electricity generators to prepare for crises.

The problem is getting a quick overview of where people are and prioritizing their evacuation or help. Therefore, it is crucial to building up a new e-service where apartment associations have their role in crises, know whom they must help and what their preparation is, and at the same time, prioritize the work of public institutions in crises.

3.6.2 E-Business Register

The second important e-register is the Estonian e-Business Register, where we get contacts and official information about apartment associations. "The e-Business Register is one of the first services of the Estonian Centre of Registers and Information Systems, being the basis for developing the Company Registration Portal and the Visualised Business Register" (e-Business Register, 2023).

"The e-Business Register is a service based on the database of the registry departments of county courts and displaying the real-time data of all legal persons registered in Estonia. You can view the data related to you free-of-charge by logging in with your ID-card." (e-Business Register, 2023). All the apartment associations are registered in the e-Business Register, as they all are legal persons.

It is accessible to the public, „citizens can view the data of the companies related to them free-of-charge, by logging into the e-Business Register with their ID card" (e-Business Register, 2023). It is essential to underline that data fees are not applied also to municipal governments. "Local Government Associations to perform the tasks specified in the Local Government Organisation Act §61 subsection 1" (RIK, 2023). In short, Kristiine District Administration gets official data about its apartment associations, like management board members, supervisory board members, owners, addresses, contacts etc. Unfortunately, this list is not always up-to-date and does not automatically mean these contacts work.

“Database also contains direct links to Official Notes, the e-Land Register, and the European Business Register” (e-Business Register, 2023).

Data requests will create a massive list of contacts in XML format. As described, “this service is intended for those users who need to make large numbers of queries to the Business Registry or to keep data in their own database. In order to use that service, the customer first needs to enter into an agreement with us. After entering into the agreement, the XML service has to be configured for the customer’s database” (e-Business Register, 2023). Probably, this would also be used in a crisis.

For local government, essential data in the e-Business Register about apartment associations are:
- Name of the legal entity.
- Register code.
- Legal entity status in the register.
- Address.
- Communication details (e-mail, phone number).
- Personal ID.
- The role of the person.
- Person's name.
- Personal ID/date of birth.

This is the list of data needed for the new e-service. This way, we get direct contact with the official apartment association members.

3.6.3 Other e-Registers

As a part of this research analysis, some other databases can be used to create new e-service.

Important ones are:

- E-Land Register.
- E-Population register.

From these e-services, it is possible to get all the technical information about the land and property and a list of registered citizens at that address. A new e-service for apartment association uses available registers data, gathers it together, and make a “one window” view.

3.7 AS-IS Process Description

In this research, Kristiine District Administration is taken as a case study. Therefore, it is crucial to describe shortly how the administration works in a crisis.

For example, when we analyze the evacuation process, there are some weaknesses in today’s crisis management system, primarily concerned with apartment association involvement.

District´s Administration is responsible for their clients, advisory, and general help during the crisis. The process varies depending on whether the administration team has electricity in an emergency crisis (as mentioned, the electricity generator’s ability is in progress).
The process can be described this way:

- Firstly, the decision is made for emergency evacuation, then Kristiine district´s crisis committee team gathers, led by the district's top management. They activate crisis plans and share responsibilities.
- The district administration is firstly responsible for their clients but must coordinate any help needed—detailed information on how to act comes from the Rescue Board.
- If needed, then evacuation is started. There are certain places where people can gather. The first information point will be opened in the district´s administration building.
- Local governments have reserves and can use generators to produce electricity and offer food, heating, and a place to stay.
- One of the most crucial functions is to share information and inform the public. Public communication is started immediately, which means sharing official crisis messages and information everywhere possible.

    - The quickest way is to put information online to official social media channels (Kristiine District Administration uses Facebook, Instagram, and YouTube), send out press releases with instructions on how to act, put messages on the homepage, print and put up same notifications to public billboards.
    - With enough preparation, the administration can produce video clips and print particular newspapers about crisis management and messages.
- District Administration focuses on its clients. The Social Welfare Department lists people who need help in every crisis. The Social Welfare Department requests information from the STAR Register of social services and benefits. It includes a list of all people who get services or benefits from the local government. When there is no electricity, requesting data from the state`s databases is impossible. There are no available lists of clients on paper.
- After checking the list, all the clients will be contacted via e-mail, phone, or paper letters. If the client is not answering and no contact is achieved, it is essential to visit the client`s location, check the health condition, and provide information about the crisis action plan. Contacting all the clients and getting an overview of their situation is important. All the actions will be documented and registered.
- The others, who are not the Social Welfare Department's clients, will be contacted by the Urban Department. The Urban Department requests data from the Business e-Register to get all the contacts of apartment associations in the area.
- Urban Department will give advice and get information if a citizen cannot evacuate himself to the designated location. Lists of people who need extra help will be sent to Welfare Department.
- Kristiine District Administration will organize special transportation for homecare patients, sick, elderly, disabled people, etc.
- When there is no electricity, it is impossible to make any data requests to STAR or Business e-Register. No paper-based databases of citizens, apartment associations, or their contacts exist. Without electricity, crisis solutions depend on how many people work in teams. Then, the focus will be on door-to-door checking and information sharing. If there are not enough team members, the focus is on vital services and keeping public gathering places functioning.

This short description illustrates well how different counterparts work on the municipal level. When there is a new e-service, work prioritization is already done, and the local municipality gets a quick overview of the area.

4 Research method and design

The author described the research method and design used to answer the research questions in this section. In this work, Action Design Research (ADR) method is used. „ADR is a research method for generating prescriptive design knowledge through building and evaluating ensemble IT artifacts in an organizational setting. It deals with two seemingly disparate challenges: (1) addressing a problem situation encountered in a specific organizational setting by intervening and evaluating; and (2) constructing and evaluating an IT artifact that addresses the class of problems typified by the encountered situation. The responses demanded by these two challenges result in a method that focuses on the building, intervention, and evaluation of an artifact that reflects not only the theoretical precursors and intent of the researchers but also the influence of users and ongoing use in context“ (Maung K. Sein, Ola Henfridsson, Sandeep Purao, Matti Rossi, Rikard Lindgren, 2011). The research answers the central question (RQ1), and then two sub-questions (SQ1, SQ2). Altogether, it is three questions. RQ1 relates to the proposal of the new e-service; the other sub-questions support the analyses.

RQ1. How to improve digital cooperation between local governments and apartment associations to prepare for crises?
SQ1. How to create a digital infrastructure that would guide the preparation for crises and give a full online overview of all the apartment associations in the district?
SQ2. How to share information and continue communication with older people in emergency crises?

In practice, these processes are continuous and parallel. When some business requirements are formulated, they will be tested, and through reflection and training, it can change again. This was a part of this research.

This research viewed field problems and used the ADR method, stages, and principles as follows:

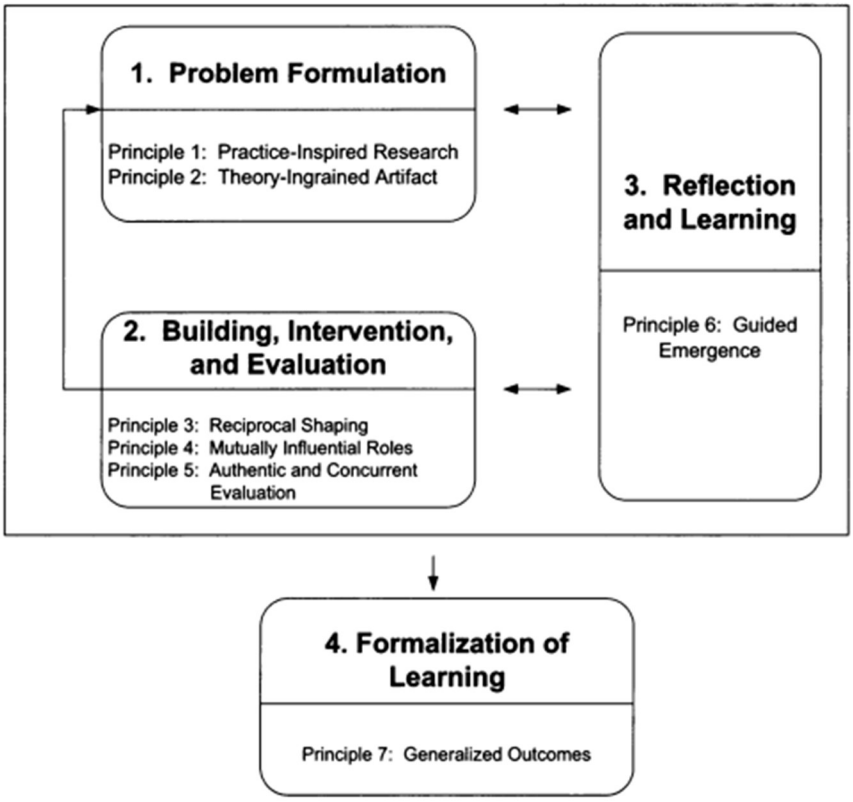


Figure 2: ADR Method: Stages and Principles (Maung K. Sein, Ola Henfridsson, Sandeep Purao, Matti Rossi, Rikard Lindgren, 2011).

Tasks in the problem formulation stage are: (1) Identify and conceptualize the research opportunity, (2) Formulate initial research questions, (3) Cast the problem as an instance of a class of problems, (4) Identify contributing theoretical bases and prior technology advances, (5) Secure long-term organizational commitment, and (6) Set up roles and responsibilities (Maung K. Sein, Ola Henfridsson, Sandeep Purao, Matti Rossi, Rikard Lindgren, 2011). In this research, (1) analyze was done to describe the problem and, according to problem formulation, raised questions regarding the crisis management, local municipalities' role, and cooperation with apartment associations. Problems were specific to Tallinn City and Kristiine District; it was taken as a case study (2) then a workshop with the elderly was done to get an overview of their problems and technological readiness, as the elderly are the most vulnerable age group in different crises, (3) then there were two meetings with crises experts from Tallinn city government, (5) taking everything into account, new e-service was offered, and (6) finally interview

with crises experts from the Rescue Board was done to evaluate the results of this research and get feedback for the offered new e-service.

This research follows on principle, which is practice-inspired research. "ADR reflects the premise that IT artifacts are ensembles shaped by the organizational context during development and use. The method conceptualizes the research process as containing the inseparable and inherently interwoven activities of building the IT artifact, intervening in the organization, and evaluating it concurrently" (Maung K. Sein, Ola Henfridsson, Sandeep Purao, Matti Rossi, Rikard Lindgren, 2011). Due to the high cost of programming and ICT tool development, there is offered only general idea of a new and better e-service, its design. Therefore, this will need further work, future investigation, and governmental decisions to continue developing and testing offered new e-service. „In conceptualizing IT artifacts as ensembles, we recognize that they are shaped by the context of their use" (Maung K. Sein, Ola Henfridsson, Sandeep Purao, Matti Rossi, Rikard Lindgren, 2011). Therefore, new e-service development will be continuous.

This research uses Kristiine District Administration and apartment associations in the area as a case study. The process can be named as modified research design. In Figure 3, there is a generic schema, how the roles are divided between researchers, practitioners, and end-users; how the alpha – and beta-version are created, and how the artifact. "As organizations become more digitized, their focus is shifting away from tactical and operational IT issues like efficiency, service delivery and cost reduction to more strategic and organizational priorities. This changes the focus of IT organizations from internal operational excellence, supported by IT reference frameworks , to effective value creation and the customer experience. This change asks for new ways of defining IT services and the underlying operations" (Miles Herrera, Jos van Hillegersberg, 2016).

Figure 3 illustrates it, how business requirements are formulated, how they will be tested, and through reflection and training, how everything change again.

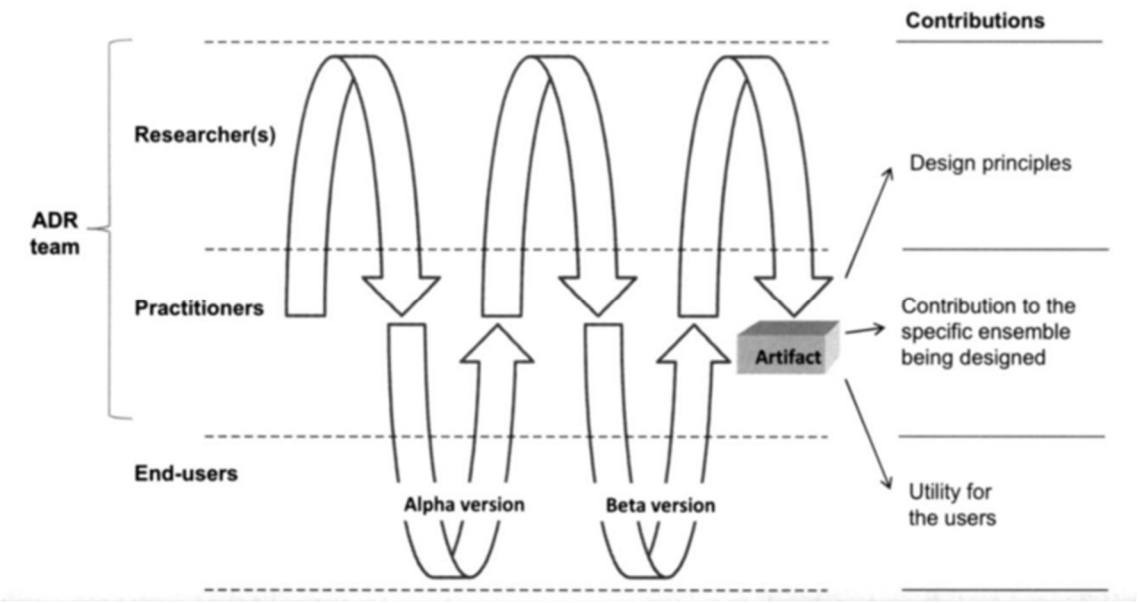


Figure 3: The Generic Schema for IT-Dominant BIE (Maung K. Sein, Ola Henfridsson, Sandeep Purao, Matti Rossi, Rikard Lindgren, 2011).

Figure 4 summarizes this study and begins with the problem statement, analysis, workshop, meeting with experts, requirements description, e-service idea creation, and ends with the evaluation of a new e-service idea. The result proposed during the work was finally validated through an expert interview. The development process of the new e-service can be described shortly as follows:

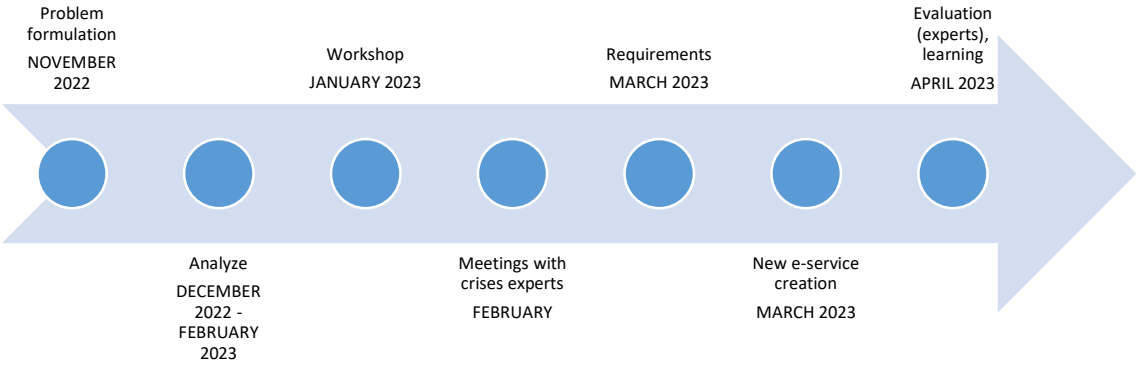


Figure 4: E-service development process

There are no alpha or beta versions in this research context, but some concrete e-service requirements can be considered in the service programming order or design process. Practitioners are the experts who participate in meetings and interviews. Also, in the workshop elderly's opinion was considered. "Carried out as an iterative process in a target environment, this phase interweaves the building of the IT artifact, intervention in the organization, and evaluation (BIE). The outcome of the BIE stage is the realized design of the artifact " (Maung K. Sein, Ola Henfridsson, Sandeep Purao, Matti Rossi, Rikard Lindgren, 2011).

5 Research results

The main research question was how to improve digital cooperation between local governments and apartment associations to prepare for crises.

To formulate the problems and understand the e-service requirements, the author conducted a workshop with older people in January 2023 and held two meetings with crisis experts. Then requirements were listed, and a new e-service was offered. Finally, the Rescue Board experts evaluated the proposed e-service solution during the interview. The author presents the validation interview results in Chapter 6.4.

5.1 Workshop results

Workshop focused on older people, as this age group needs the most assistance and extra help in crises. People get older, and the number of these age groups grows bigger. Therefore, the questions concerned with the elderly in crises must be answered and solved and the workshop gives a good overall picture of their technological readiness, valuations, and opinions.

Workshop took place on the 16th of January in 2023. There was a pre-arranged meeting on the 16th of January from 1 PM to 3 PM in Kristiine social center in Sõpruse Street 5. All the questions in the meeting were printed out, explained, and paper-based. The workshop was carried out in Estonian.

The workshop aimed to understand the elderly`s readiness to use internet-based technology and other gadgets, to map how information spreads, and to get an overview of their expectations and preferences in different crises. It was voluntary to come to the meeting, and all the participants were pre-informed about the plan to participate in the

discussion on these crisis management and communication questions. Answers were anonymous. All the questions can be found in Appendix 1 – Workshop Questions.

Workshop questions were put together to get input to research questions, and this input could be helpful in the design of the IT solution. The research aim is to get answers (1) how to improve digital cooperation between local governments and apartment associations to prepare for crises, then (2) how to create a digital infrastructure that would guide the preparation for crises and give a complete online overview of all the apartment associations in the district, then, and (3) how to share information and continue communication with older people in emergency crises. All the input from the elderly themselves is extremely important.

There were 30 participants. 87 % of the respondents were women, and 13 % were men, including 90% of them over 70 years old. All live in Tallinn; 77% live in apartments, and 23% in private houses.

On average, older people in apartments live on the 4th floor, which must be considered in evacuation planning because most buildings do not have an elevator. 60 % live alone, and the other's average household generally has two people.

Although the elderly has had a long life, the workshop confirmed that they mostly had no previous evacuation experience. As answered, only 17% have had to leave their homes due to some accident or danger, primarily because of the war. Therefore, 83% of older people do not have a previous experience with emergency evacuation. Participants confirmed that the general evacuation topic is new to them, and they are now already thinking about possible large-scale evacuation, as this topic is actively discussed in public media because of the war in Ukraine. Question 9 asked, "lately, how often have you thought that a large-scale evacuation is possible due to an emergency?" It showed that 27% often and 30% once or twice.

70% of respondents have a particular place to go and leave a city or evacuate themselves out of town, and 30% do not have an alternative place. Although 41% of respondents have shelter (or basement) in their household, 59% do not.

Awareness of crisis solutions existing today is low. For example, 63% do not know the locations of public shelters in Tallinn, 43% do not know where to call in case of danger, and 34% of older people wait to be contacted in the case of an emergency evacuation. It means that every third of the elderly over 70 need additional instructions or help. In case of a massive crisis, it would be better if people would contact the local government themself and ask for guidance. Therefore, new e-service for apartment associations must also give answers on how to manage and provide all the needed help to older people. The most critical e-services for the elderly today are e-health, e-bank, and Tallinn social services.

31 % of respondents are not willing to leave their homes immediately in the case of an emergency evacuation. This means local governments need to know exactly where these people are and who they are and start immediately explaining the situation and convincing them to leave to save their lives in the emergency evacuation.

Now, when focusing on the technical side of the survey, the successful solutions of the crisis bear on the foundation of public registries and how trustful they are to planning crisis management. It showed that 10% of respondents do not live in the place where they are officially registered in Estonian e-Register. This is information that is extremely important in any crisis management.

Although, as the meeting showed, the internet itself is not the key solution or answer for the elderly in crisis, the solution must be hybrid, and most important is trustful information communication. 63 % do not have a car in their household, and 43% prefer public transportation for evacuation. 43 % cannot evacuate themself without any extra help to the designated location in an emergency crisis. Transportation was a topic that made the elderly worried. In the discussion, it was brought out that there is a high expectation for convenient public transportation in crisis.

Communication must answer the most critical questions. For the elderly, their priorities are: where to go (31 %), when to go (28 %), what to take with you (22 %), how to act (13 %), and how to help to solve the crisis (7 %). Yes, 7% of the elderly are ready to participate and help solve crises voluntarily.

The key question is trust. Of course, as they all were Tallinn residents, then it had a general impact on their valuation and answers. However, for the question like whom they would trust the most in an emergency crisis, the highest percentage was Tallinn city (32 %), Estonian government and state institutions (20 %), neighbors and acquaintances (17 %), board members of the apartment association (12 %), social media (10 %), and others (2 %).

Another well-known and latest tool is “Ole valmis!” application in Estonia, which give detailed information about different crises. The workshop showed that older people have mainly not used it.

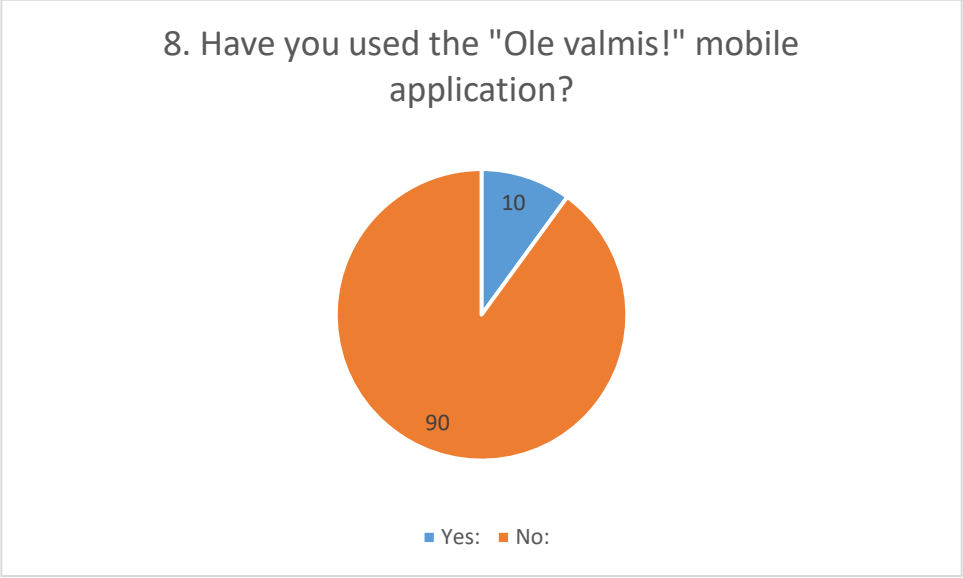


Figure 5: Elderly usage of "Ole valmis! application

In most crises, a telephone is the quickest and most direct way to share information. The design of the solution needs to consider what older people use. In sum, usage of smartphones (38 %), wired phones (25 %), and mobile phones with buttons (38 %). Some participants had many phones and used different phones with different capabilities simultaneously.

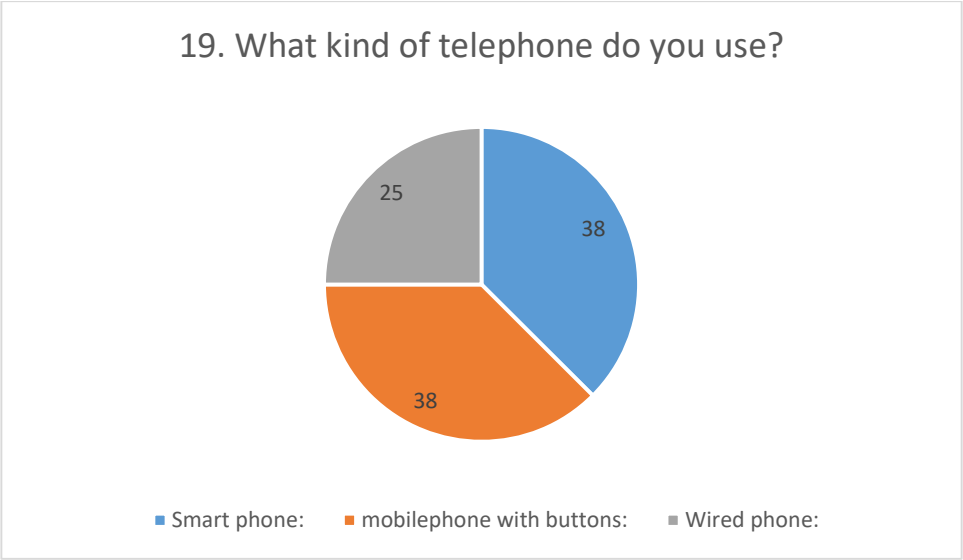


Figure 6: Elderly telephone usage

The huge issue is the usage of the internet. 57 % of respondents do not use the internet every day.

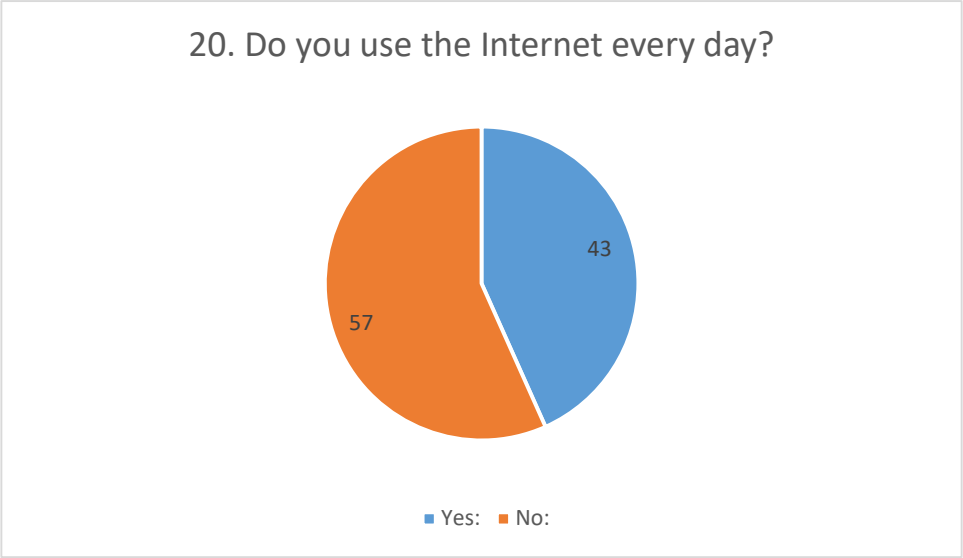


Figure 7: Elderly internet usage

41 % do not have an email account. Moreover, 63 % of respondents do not use eesti.ee e-mail accounts.

Figure 8: Elderly e-mail account usage

The workshop showed that 50 % of elderly respondents use social media (mostly mentioned Facebook). Therefore, social media is a critical source of information for them. Nevertheless, it is not as crucial as traditional communication channels. The survey showed that people in apartments get information about what is happening in their home area mainly from television (24 %), radio (24 %), city newspaper (17 %), internet news pages (12 %), social media (9 %), Neighbors and acquaintances (8 %), other newspapers (4 %), and other channels (1 %).

When the workshop focused on how they would like to receive information about an emergency or large-scale evacuation, answers changed. The information must be direct and as quick as possible. Preferences were radio (16 %), television (15 %), SMS to personal phone (15 %), telephone calls (13 %), official e-channels and websites (9 %), social media (7 %), loudspeakers in public places (7 %), paper letter to post office box (7 %), newspapers (6 %), and e-mail letter (5 %). Solution design probably must combine the way it is now and how the elderly prefer it in crisis.

Questions that examined how the elderly communicated with each other at home gave some surprising results. Firstly, 70% of respondents do not communicate with neighbors person-to-person daily, but they still get information and are very well informed. Information is spreading in different ways, such as person-to-person talk (30 %), phone

calls (28 %), printed information on the stand (28 %), e-mail (11 %), and other channels (2 %).

Results showed that older people are active and want to participate. Therefore, it is not right to look at them as a problem to solve but as an additional resource in crises. For example, 43 % of respondents are ready for volunteer work during a possible emergency crisis in the city. The question is what the proper role for them is. They already have food reserved at home because 80% confirmed that, and 20 % do not. Therefore, the first problem for the elderly is not food because they have already prepared for that. Moreover, the elderly knows their home area very well; 50% know other people who cannot evacuate themselves in crisis. In sum, they already have information about neighbors and acquaintances. It must be somehow put together to the local network and sent to the local government, and it can be achieved with the help of a new e-service.

Lastly, regarding the elderly role in the evacuation crisis, as they answered, 90 % of respondents confirmed that they are ready to voluntarily share information about the crisis with their neighbors and acquaintances. This is a high number that can be a part of the new e-service.

In the discussion, respondents brought out the need for convenient public transportation, which trajectories to use with personal transportation, safe evacuation places to stay, and need for trustful and detailed information about the crisis and an explicit schedule for leaving home.

The elderly fear massive traffic jams, lack of food or water (although they have some reserves), need for psychological support, and question how to maintain local social workers' support in evacuation.

A new e-service for apartment associations can be designed considering the information and feedback from the elderly, for example, preparing to evacuate people with special needs, using different channels to share information (including billboards), building shelters, collecting food reserves etc.

In sum, the elderly are the most vulnerable age group in different crises. The awareness of crisis management among the elderly is low, and 31 % of them are not willing to leave their home in the case of an emergency evacuation. The usage of existing solutions is low, for example, eesti.ee email account or "Ole valmis! application. Nevertheless, on the other hand, they are very well informed about what is happening in their home area and who need more help. Therefore, it is crucial to build up new e-service with apartment associations, which also help to prepare the elderly for other crises and build up a network that they trust. Finally, the future solution must be hybrid. Unfortunately, the workshop showed that today's state`s solutions for crisis communication would not fully work with the elderly.

5.2 Expert meetings results

To get feedback and answers to research questions, get overview of the crises management, apartment associations and local governments cooperation, two meetings were held with Tallinn Municipal Police Department crises management experts. The first meeting took place on the 23rd of February 2023 and was a meeting with a Tallinn Municipal Police Department expert and head of the crisis management field in Tallinn, and the deputy head of the office - head of the department. The second meeting took place on the 2nd of March 2023 with Tallinn Municipal Police Department leading specialist.

Both meetings lasted about 60 minutes. They were free-form meetings, where research questions were asked, some basic ideas about the possible solution were introduced, experts gave feedback and overview of the main problems in the field, also some suggestions, then took place discussion, and the ideas were written in memo format.

Summary of the 23rd of February 2023 meeting with Tallinn Municipal Police Department expert and head of the crisis management field in Tallinn and deputy head of the office - head of the department.

In a crisis, the state will give a lot of tasks and orders to local municipalities. Local municipalities must be prepared for different crises.

Digital infrastructure must guide the possible evacuation in many ways, whether people leave or evacuate to the city from outside. Also, it is possible that in some crisis situations people have to move between different districts in the city, for example, from Kristiine district to Mustamäe district. Therefore, direct cooperation with apartment associations and people is crucial.

The huge problem is that even apartment associations do not have all the contacts of those who live in their houses. New e-service could help keep residents' lists for local governments and apartment associations.

Digital infrastructure can reduce the need to use the human workforce of public administration. In a crisis, it is unclear how many people are physically at work; technology could help a lot.

Communication is a critical task in crisis management. For example, it is crucial to send information about transportation points for evacuation to all the citizens. There must be tools to do it effectively, and new e-services could benefit communications. In sum, all the data must be kept according to data protection laws in the European Union. What must be underlined, is that a) the apartment association already keeps a register of who owns the apartments in their building, b) the apartment association can create a database of residents, who live in the building, and a new e-service can be a place where to keep the list of residents. The question is, what could motivate apartment associations to cooperate more with local governments. Unfortunately, Estonia has an e-Population Register, which does not give complete information about where people live.

Finally, the Estonian state has started discussing how to improve shelters quickly and evacuation places in old buildings. If there will be additional investments from the state, then a new e-service could also be a format or tool to get an overview of who need to support, and how to prioritize the investments.

Summary of the meeting on 2nd of March 2023 with Tallinn Municipal Police Department leading specialist:

In this meeting, more technical details were brought out.

A huge issue for municipalities is the real contacts of apartment associations. There is no complete, trustworthy database with information about apartment associations and their preparedness, which could support local governments' activities. For example, even Estonian e-Business Register has contacts that are not updated. Which data can be used from the state's databases for new e-service, this needs to be analyzed.

An interesting idea could be to connect the idea of a new e-service with the safety of the property. When a citizen buys an apartment, it is usually unknown about possible dangers in the area and the house's preparedness for crises. This could affect the price of the property. A new e-service could give this information.

The Rescue Board also works with apartment associations, which needs to be considered when creating a new e-service.

Also, there is a problem with the tenants, usually, local municipalities and apartment associations do not know who the tenants are. This could be solved with a new e-service.

Decent apartment associations have needed reserves and action plans, which could motivate others in the area. Within the apartment associations, tasks are shared in crisis, and in emergency, they are all in the same trouble. Therefore, cooperation with different counterparts is extremely important. New e-service could support solving crises. Tallinn Municipal Police Department also sent an overview of Tallinn's apartment association, described under Chapter 3.2.

To conclude thoughts from two meetings and workshop:

- New e-service could help to manage communication in crises. This can mean quicker communication, more detailed contact lists, and better letter registration. For example, in the case of emergency evacuation, it is important to inform everyone about transportation points.

- All the apartment associations could have a valuation process from the point of view of preparedness for crises. It could help prioritize local governments' work in and before crises. Moreover, this e-service could help the apartment associations to keep the model crises plans, lists of residents and their contacts, descriptions of capabilities etc. As the workshop with the elderly showed, Estonian e-Population Register is not showing where people live. This could lead to direct contact between local governments and apartment associations. A full overview can be achieved through valuation marking - red, yellow, or green house. In a real crisis, problematic ones are red houses.
- New e-service could also help to prioritize everyday work. For example, help to give financial support to places where it is most needed. Moreover, the Rescue Board could get valuable information from new e-service, which is divided between different registers today or unknown. In the future, when citizens plan to buy property, they can already use the new e-service to get an overview of preparedness for crises and possible threats in the area.

6 Proposal of a new e-service for apartment associations and local municipalities

Considering the case study of Kristiine district, secondary data analyses, workshop with the elderly, and meeting with experts, it is necessary to create a new e-service for apartment associations and local municipalities, which uses all the available state's databases and adds new value. The idea is to create a new e-service that could help to lead better preparation for various crises and manage communications in the crises.

For local governments, this would help to create a complete overview of their municipality's apartment associations, an overview of vulnerable people who live in these buildings and would need some specific help in different crises, their location, health, and details about their possible evacuation plan. New e-service must be accessible and convenient. Therefore, service will be provided at any time needed and online 24 hours, 7 days a week.

It is planned to use different e-databases containing the data list. Next, it is described all the e-databases which will be used in the new e-service.

All information about the land, its ownership, and legal issues.

E-Land Register:

1. Property number.
2. Land Registry department.
3. Property name.
4. Property type.
5. Cadaster code.
6. Stated purpose.
7. Location.
8. Size.
9. Restricted property rights.
10. Owner.

11. Servitudes.
12. Mortgages.
13. Usage rights.
14. Pre-emptive rights.
15. Preliminary notations.

Information about the apartment association`s status and businesses registered on that location.

Business e-Register about apartment associations:
1. Name of the legal entity / Name of the apartment association.
2. Register code.
3. Legal entity status in the register.
4. Address.
5. Communication tools.
6. Personal ID.
7. The role of the person.
8. Person's name.
9. Date of Birth.
10. Name of the registered businesses on location.
11. Contacts of registered businesses on location.

Information about all the people, who live on that location.
E- Population Register:
1. given name and surname.
2. birth data (date and place of birth).
3. sex.
4. personal identification code.
5. citizenship.
6. information on domicile and additional addresses.
7. contact details (telephone number, e-mail address).
8. information of the place of residence.
9. personal identification document.

Information about people who get additional social help, benefits, or services on that location.

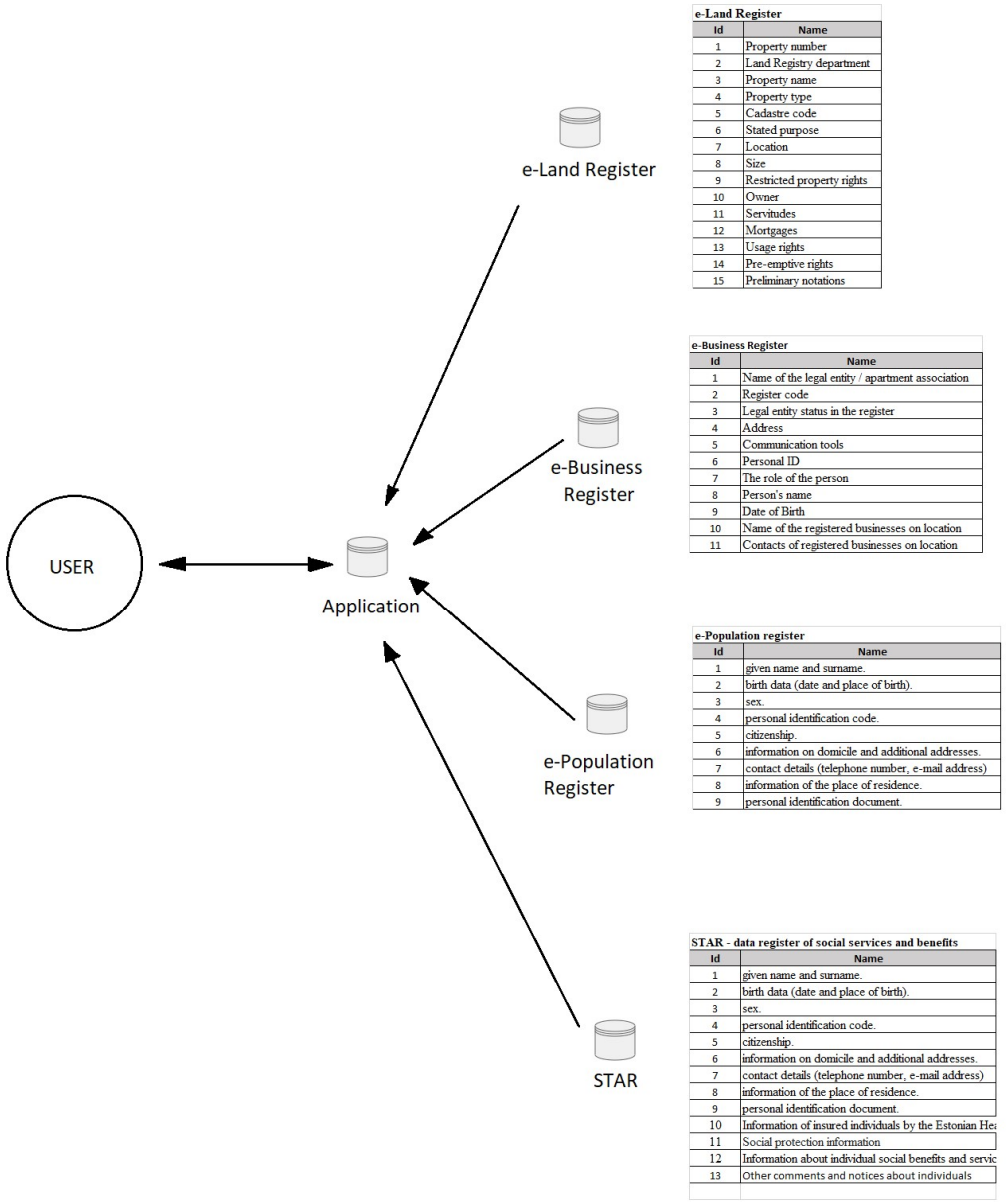
STAR, which is data register of social services and benefits:

1. given name and surname.
2. birth data (date and place of birth).
3. sex.
4. personal identification code.
5. citizenship.
6. information on domicile and additional addresses.
7. contact details (telephone number, e-mail address).
8. information of the place of residence.
9. personal identification document.
10. Information of insured individuals by the Estonian Health Insurance Fund.
11. Social protection information.
12. Information about individual social benefits and services needed
13. Other comments and notices about individuals.

The new e-service has many plusses, like (1) saves time and resources for users, (2) goal is to create one window for crises management, (3) there is no need for human interaction in the future, (4) e-service will be working on cloud-based technology, is accessible all the time, (5) all feedback and communication will be online, and (6) contacts can be updated daily, or there can be many active contacts.

The e-service and its application are integrated with X-road. All the data is requested through X-road.

Figure 9 illustrates it how dataflow for new e-service will work:



e-Land Register

Id	Name
1	Property number
2	Land Registry department
3	Property name
4	Property type
5	Cadastre code
6	Stated purpose
7	Location
8	Size
9	Restricted property rights
10	Owner
11	Servitudes
12	Mortgages
13	Usage rights
14	Pre-emptive rights
15	Preliminary notations

e-Business Register

Id	Name
1	Name of the legal entity / apartment association
2	Register code
3	Legal entity status in the register
4	Address
5	Communication tools
6	Personal ID
7	The role of the person
8	Person's name
9	Date of Birth
10	Name of the registered businesses on location
11	Contacts of registered businesses on location

e-Population register

Id	Name
1	given name and surname.
2	birth data (date and place of birth).
3	sex.
4	personal identification code.
5	citizenship.
6	information on domicile and additional addresses.
7	contact details (telephone number, e-mail address)
8	information of the place of residence.
9	personal identification document.

STAR - data register of social services and benefits

Id	Name
1	given name and surname.
2	birth data (date and place of birth).
3	sex.
4	personal identification code.
5	citizenship.
6	information on domicile and additional addresses.
7	contact details (telephone number, e-mail address)
8	information of the place of residence.
9	personal identification document.
10	Information of insured individuals by the Estonian He
11	Social protection information
12	Information about individual social benefits and servic
13	Other comments and notices about individuals

Figure 9: Dataflow for e-service

E-service creation is planned to be divided into three development stages, and first stage goal is to answer this research question and solve the main problem.

New e-service users would be:

- local government's administrator (first development stage).
- apartment association's responsible user (first development stage).

- Rescue Board (second development stage)
- other users (third development stage).

The owner of the e-service is the Estonian Republic, belonging to the field of work of the Ministry of the Interior. The view of the e-service is divided into two parts: first, the entire view with all the available data is for local municipalities, and second, the limited view with statistical models and anonymous profiles is for apartment associations. For example, apartment associations do not see exactly who gets services or financial support from the local government, but they see the house profile, like two people with wheelchairs etc.

The new e-service will give the local government a quick overview of residents and apartment associations. This overview allows buildings to be shared in green, yellow, and red categories. This valuation will be given to every apartment by the local government. Then according to the valuation, a model action plan will be made in cooperation with the local government and apartment association. Goals will be formulated. In the long term, red ones will become yellows and yellows become greens. All the data sharing is coordinated according to the law.

In case of crisis, this will help to prioritize the local government's actions and usage of resources. Green means that the apartment association has everything to cope with the crisis and, if needed, can evacuate its people independently. Yellow means that there is an action plan, but improvements are needed. It can be different resources, investments, or capabilities. Red means that the building is unprepared for crises and needs help to manage it.

It will be an e-service where it is possible to communicate with each other directly, see all the available information about the building, its technical details and needs, information about vulnerable people, and plan for their evacuation. Moreover, all the e-service users can add additional information to the system.

How will it work?
(1) The apartment associations must download the e-service application onto the smartphone or use the local government's homepage (For example www.tallinn.ee).

(2) Apartment association's authorized person gets access to the e-service and sees all available information from the state's databases. This authorized user of the apartment association is the same, marked as official contact in the e-Business Register.
(3) authorized users can fill in information about their house and available resources, and add any additional comments, documents, or remarks to the database. For example, users can add information about shelter conditions, food, gas or oil reserves, usable tools, generators, cars, extra information about residents, etc., which can be essential in different crises. The system can be used from a smartphone or a personal computer.
(4) The apartment association contacts the local government (as a personal assistant). In the e-service, a particular safe communication channel will be used to contact each other. All the communication will be archived and afterward can be re-checked.
(5) All the other databases information is gathered onto "one window view" e-service, which is interfaced with X-road, data used from different databases, such as STAR, Business e-register, e-Population Register (RR), Information system of the Health Insurance Fund, Real Estate Book, etc.
(6) Users have different administration accesses so apartment associations will be created only anonymous views of their house, detailed information about people is not shared. Technical details are public and are accessible to the apartment association. Anonymous view for apartment associations means that they get data, which is vital from the crisis management point of view. All the personal information is anonymous for the apartment association. For example, the user gets information on how many people with special needs live in this building, and what their needs are in crisis, but they do not see who they really are. So, the service creates a profile of residents in the building for apartment association. It helps them to prepare for crises, think through different scenarios, and make action plans. For example, apartment association user sees the number of people with disabilities, wheelchair users, homecare patients, etc.
(8) Local government gets the full detailed view of every apartment association in the area.
(9) When access is granted for both sides, e-service will be activated, and different actions will be planned in cooperation.

The general schematic view of the apartment association and the local government's users is presented in Figure 10.

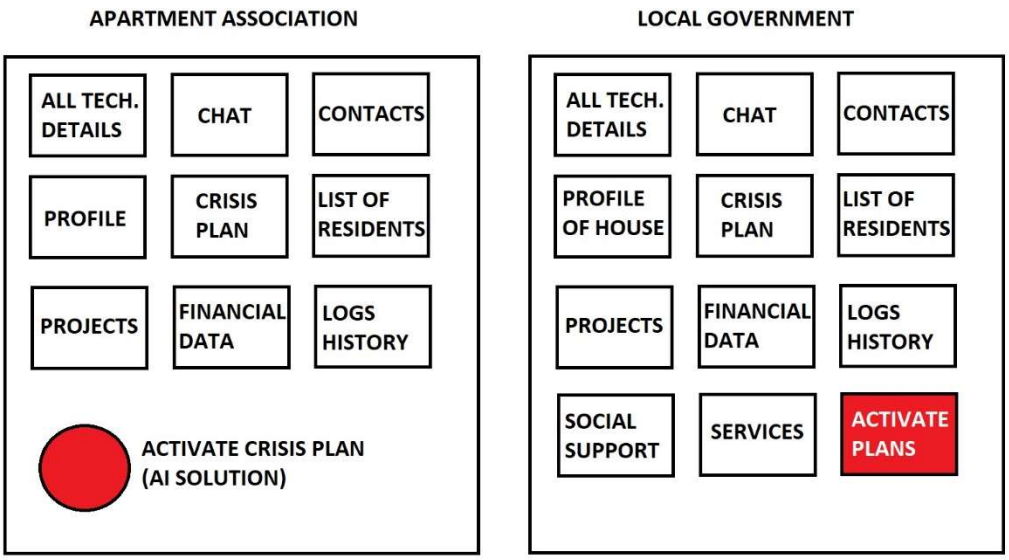


Figure 10: User's view of service

E-service system creates archive about:

- Building technical documentation and details.
- List of owners of the property.
- List of residents living in the property.
- Letters.
- Notices.
- Answers- questions.
- All other documents.
- Descriptions of resources.
- Descriptions of action plans.
- Agreed on emergency plans.
- Procedures.
- All other logs.

6.1 User's competences

In different stages of development, there are different users. Next, it is described the competencies of different users.

Local government's administrator competencies:

- See all the information available from different databases about apartment associations and their residents.
- Create a crisis management plan cooperating with the apartment association and evaluate developments.
- Send advice to apartment associations on building capabilities to help and respond to crises. It means notices, comments, and letters.
- Register letters and communicate on daily bases. Every apartment association will have one contact person in the local government (system moderator) who will help the house.
- Start official procedures and make orders.
- Help to solve different problems.
- Write other comments and notices about the apartment association.
- Check the documents according to the law.
- See all the available information about the apartment association and its residents and make different action plans and scenarios according to it. It includes the list of the people who get benefits and services from the local government.
- Make decisions about different municipal project investments.
- According to the information in the e-service database, give statuses and rating signs to the apartment associations (red, yellow, or green).
- Prioritize work in the context of crisis management.

There can be many local government administrators. This role can be shared between different people inside municipal organizations. Therefore, it does not have a concrete name of the person but a role.

Apartment association's responsible user competencies:

- Write, accept, and agree on crisis and development plans offered or coordinated with local government.
- Send information and describe capabilities.
- Describe available resources and update them.

- Write letters, ask questions.
- Leave notices.
- Ask for assistance and financial support for the projects.
- See anonymous general information about its building residents (house profile). Use this information to plan apartment associations' investments and plans.
- Keep a list of residents and owners in the e-service online database.
- Ask for financial support for different projects.

In the second stage of development of the e-service, Rescue Board also will have access to the system so that they can use information from the e-service. For example, if there is accident in the area, they will automatically request data from the database to get information about residents and their needs. In case of a fire accident, if the fire brigade drives out, they would see how many and where the most vulnerable people live, adding other technical details about the building itself before they get to the location. It could be a part of the operative card.

In the context of this research, it would be divided into development phases, three stages: 1) local government and apartment association connection (D1); 2) adding the Rescue Board connection (D2), and 3) opening anonymous profile data access to all other people (d3). In sum, three stages of artifact were developed in this work.

First development stage:

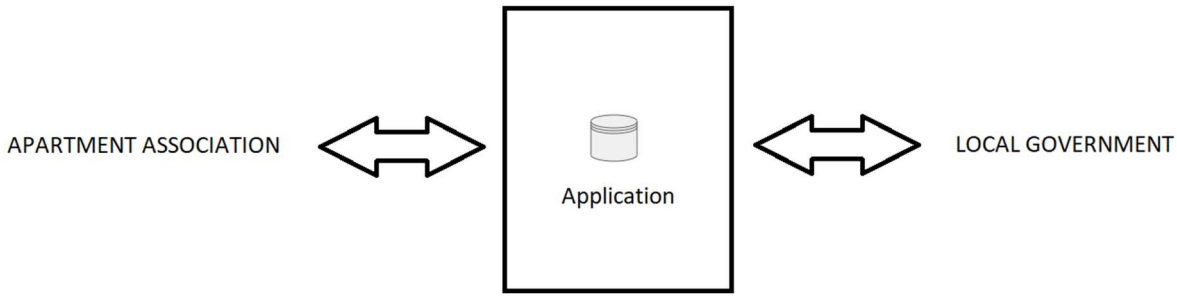


Figure 11: First development stage of new e-service (D1)

The first development stage answers this research question how to improve digital cooperation between local governments and apartment associations to prepare for crises.

Second development stage:

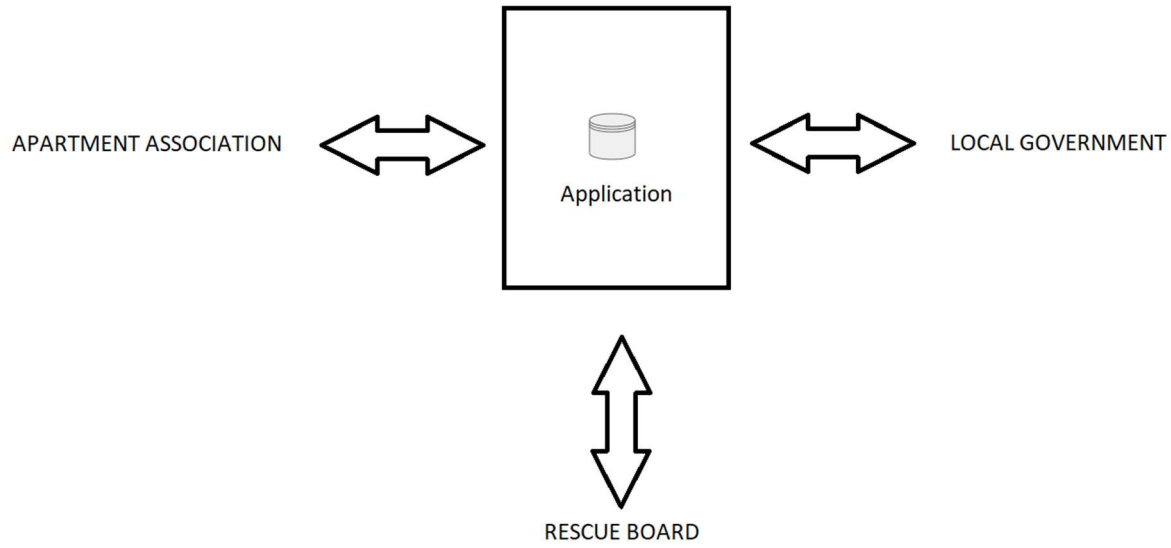


Figure 12: Second development stage of e-service (D2)

The second development stage adds information from the Rescue Board and helps other counterparts manage crises.

Third development stage:

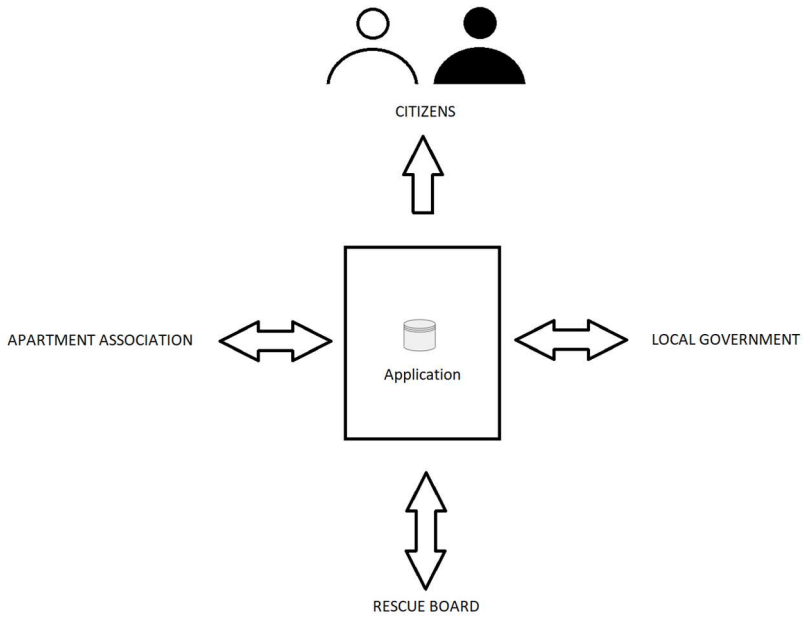


Figure 13: Third development stage of e-service (D3)

The third development stage would open new e-service to the public. This would help citizens guide them to decide about a property based on crisis management and preparedness of every apartment association.

As described before, all the apartments will have a rating (status). An overview of the area will be given to the local government in the format of an area map. This is illustrated in map format and will be an e-service tool for the local government after the first stage of development.

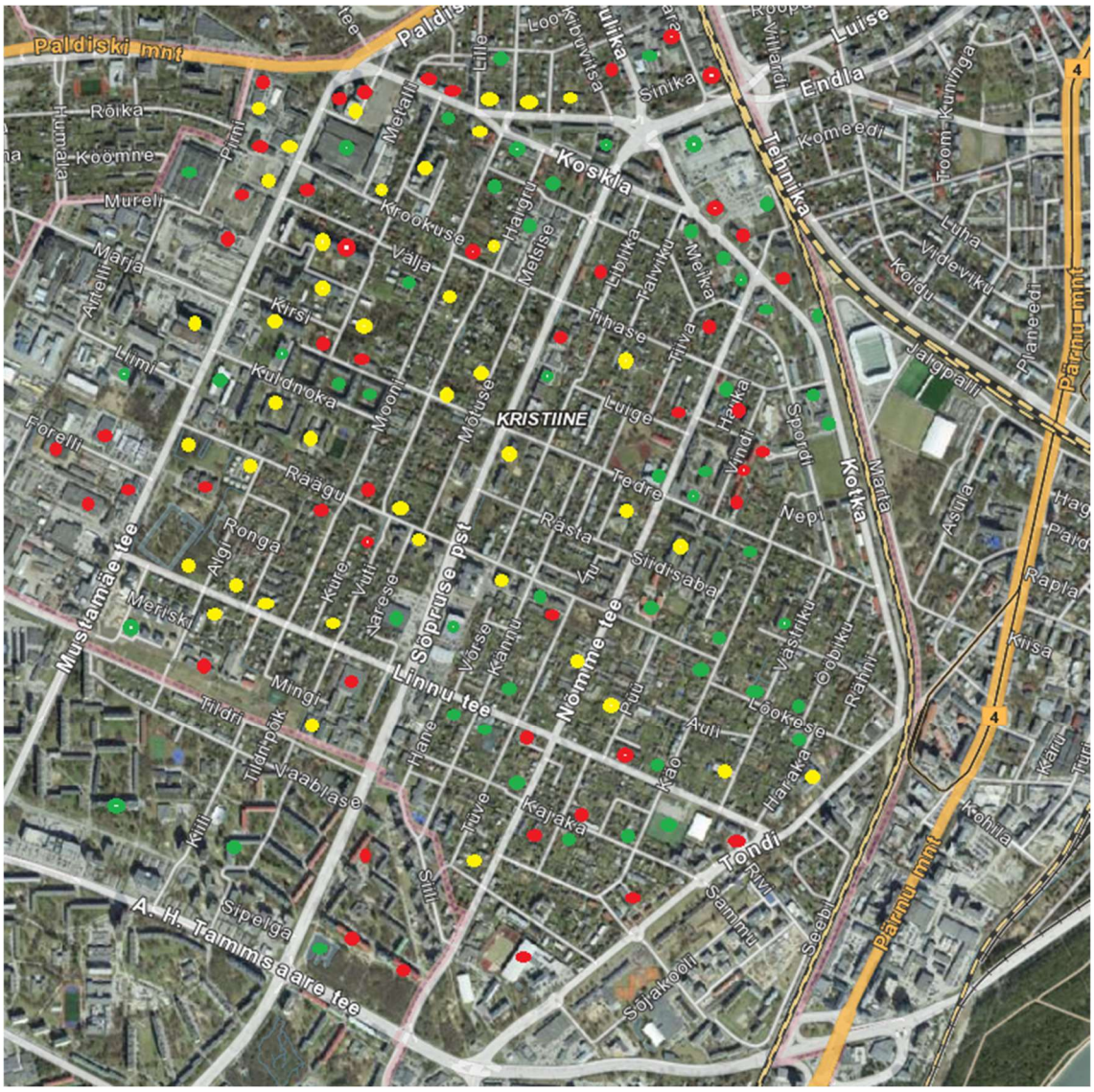


Figure 14: Overview of the area with apartment association statuses[1]

[1] Map from: https://xgis.maaamet.ee/

6.2 Descriptive diagram of the area-of-competences

To illustrate different users are of competences, descriptive diagrams are made:

Local government:

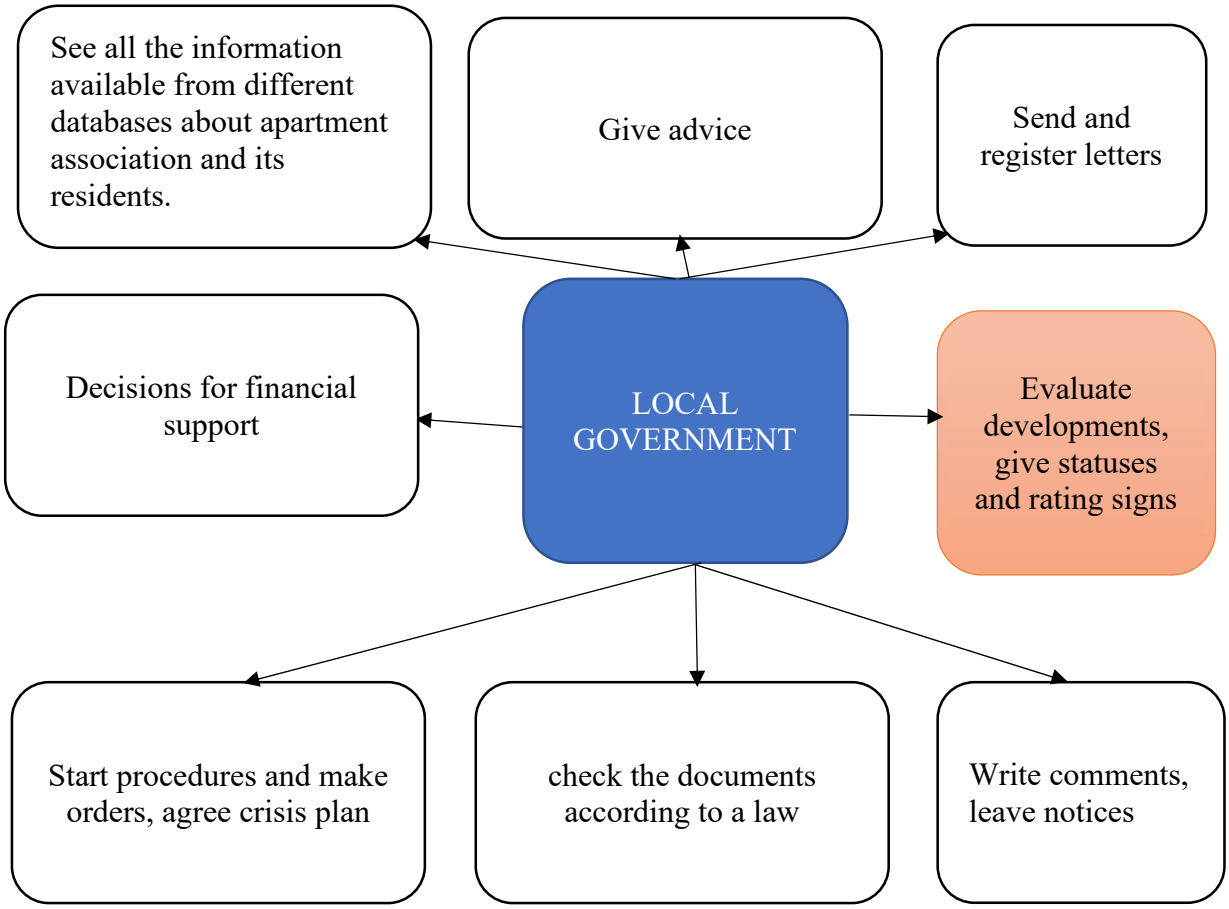


Figure 15: Local government`s competences

In summary, the local government can access a detailed house view. It means the role includes (1) contacts and names of the residents and owners of the property; (2) lists of the people who get benefits and services from the local government, (3) can send letters to apartment associations, and (4) read the information added by the apartment association, (5) give advice, (6) see all the technical information about the house, (7) leave notices, write comments, (8) start official procedures, make orders, (9) agree crisis plan, (10) evaluate developments, (11) according to the information give statuses and rating

signs, and if decided, then (12) make decisions for financial support by the local government based on the information in the database. Every apartment association will have one confident contact person in the local government (meaning system moderator), who will help to make development and crisis plans of the house.

Apartment association:

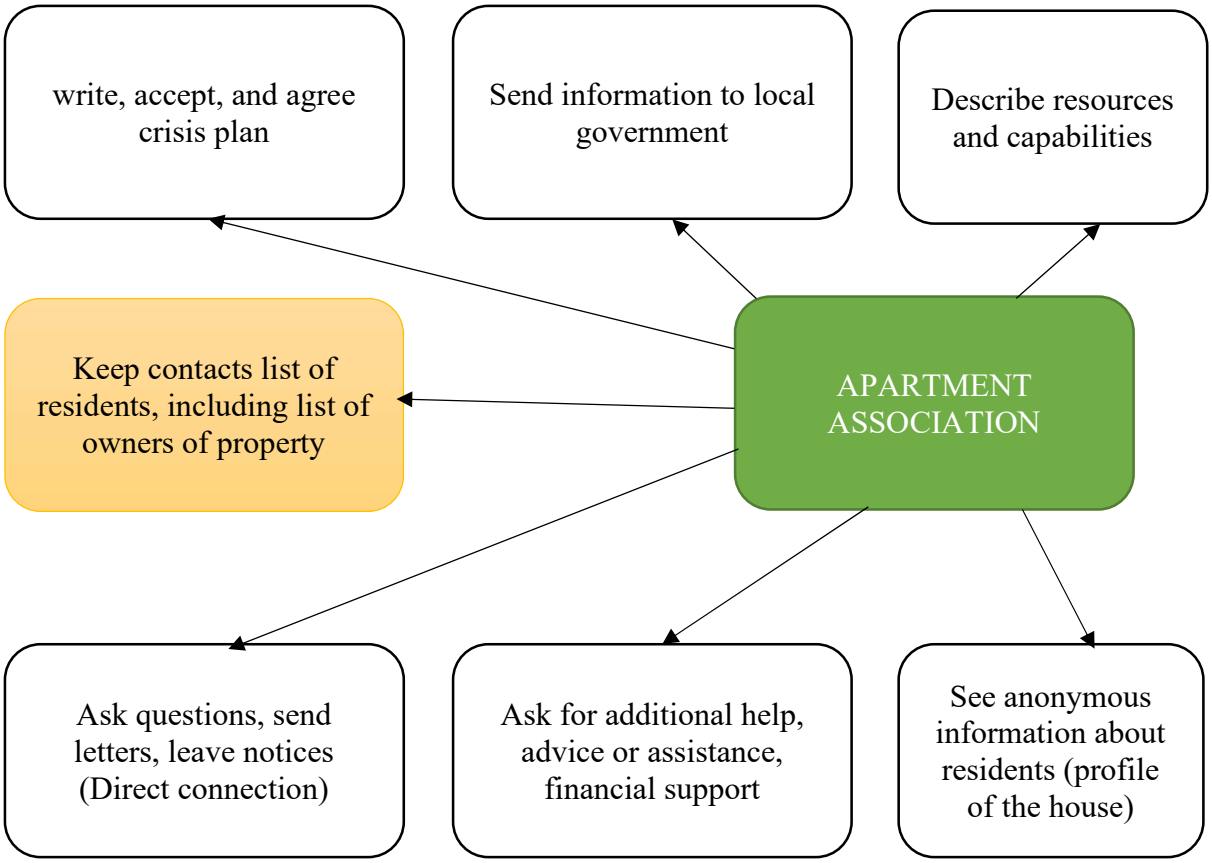


Figure 16: Apartment association`s competences

In summary, this role includes (1) the apartment association can keep contacts list of the residents and owners of the property, (2) asking questions, leaving notices, send letters, (3) having one responsible direct contact in the local government, (4) ask for additional help, advice, or assistance, (5) ask for financial support, (6) send information, (6) create crisis and development plan of the house, and finally, (7) describe resources and capabilities.

6.3 Cloud Architecture Model

This new e-service will be an online cloud-based service. Apartment Association's users can use the service via mobile or the web. The actions that can be done are upload, view, and share documents, read, and send messages, upload pictures and videos, and see the service logs. Apartment Association's user makes crisis and development plans of the house, keeps contacts, and sees the anonymous profile view of the house.

On the other side, there is the local government's user, usually the system's moderator, but there is also the system administrator. Important topics of the back end of the cloud service are the application itself, storage, cloud runtime, infrastructure, management, and security. All the e-service databases are connected through the X-road interface. In the future, there can be other services.

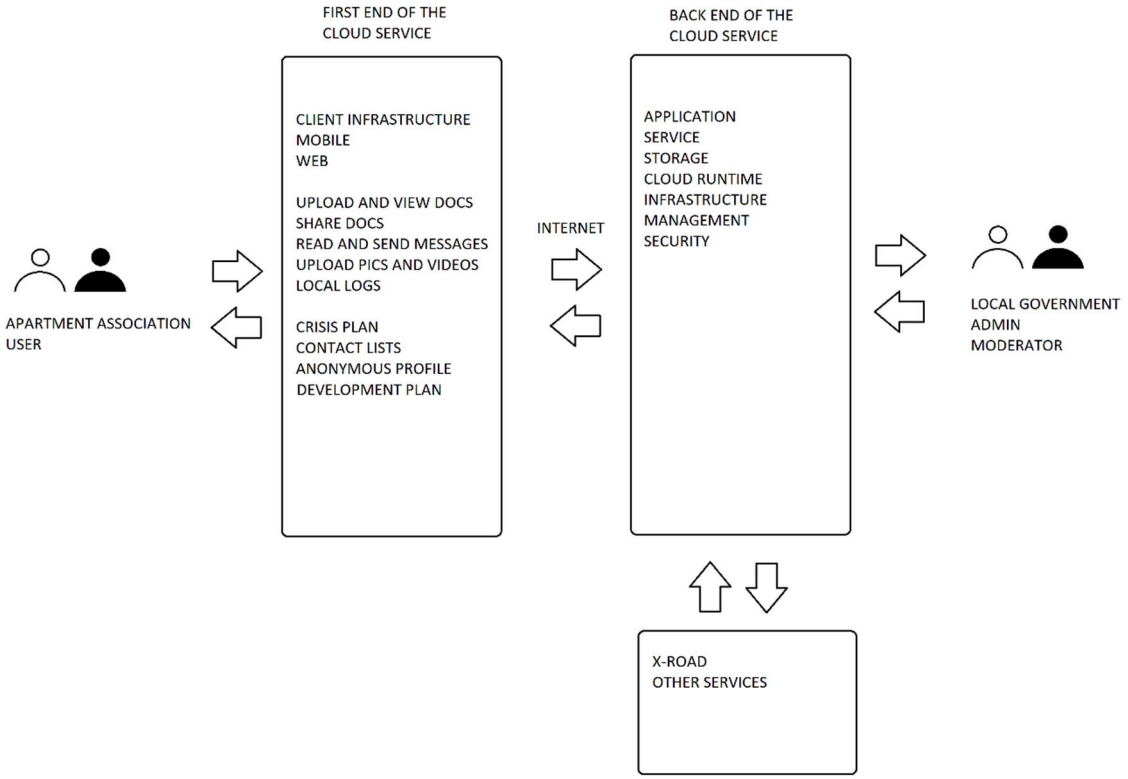


Figure 17: Cloud Architecture Model

6.4 Validation

To validate the new e-service solution, an additional meeting with the Rescue Board and Tallinn Municipal Police Department was held on the 13th of April. The meeting took place via the Microsoft Teams application, and it took about 60 minutes. The author gave a short overview of the new e-service, represented the research questions, and then took place free discussion. The author made a short memo of the meeting about opinions, possible problems, and questions asked. The interviewees were asked to validate the solution, give an opinion whether it is needed, and give critical feedback.

Meeting participants were the adviser of the prevention work department of the Rescue Board, the Crisis preparedness adviser for local governments of the Emergency Preparedness Department of the Rescue Board, the shelter Advisor of the Emergency Preparedness Department of the Rescue Board, and the Tallinn Municipal Police Department Tallinn specialist.

Participants agreed it would be a new necessary e-service that does not exist today, but the main obstacle could be the data protection issues. It is debatable to what extent it is allowed to send data, collect it and share it with different counterparts, including regular citizens in the third stage of development. The legal analysis could be the next research work in the future.

When the prototype of the new e-service is ready, it would be good to involve the Estonian Union of Co-operative Housing Association to test it and redesign it according to their feedback.

A huge question is how much the new e-service creation and development cost would. In the public sector, projects are valuated according to the investment's cost and the project's impact. Therefore, it is crucial to evaluate the costs of the project.

The new e-service could also be a good tool for the Rescue Board because now, sheltering conditions valuation is done according to the home visit. If we can activate apartment associations themselves, then it would save a lot of work time.

Still, the question is how to motivate apartment associations to participate in the new e-service and make them more active. Moreover, most apartment associations do not have the correct list of contacts for their house.

Usually, on paper, the interface to the databases seems easy, but, it is not. Many other projects do not have the correct interface to the different databases, so they cannot be developed.

The Rescue Board does not know today where people live who need extra help. Therefore, it is an excellent link to create in the new e-service. Local government has a considerable role in crisis management. This makes it more systematic.

Finally, there must be a plan for crisis management when there is no Internet or electricity.

The author agreed with the advice of the Rescue Board experts. Generally, feedback supports the goal of creating a new e-service, but it gives some extra questions for further research directions.

7 Limitations and future research directions

Due to the high workload of public institutions' crisis experts, finding enough stakeholders to get expert interviews and meetings was challenging.

Some crises response plan's details are only for internal usage by governmental organizations; therefore, all the available information cannot be discussed in detail. Some details relate to national security and are not subject to disclosure.

As described in Chapter 5.1. and according to workshop with older people, one of the other limitations is that 23% of responders were from private houses. After new e-service creation and mapping of all the districts' areas, this will be the local government's work to visit all the private houses, either, where the elderly live alone and who do not have apartment association support. People who live together with someone in private houses are not in such a vulnerable situation. This could be marked in the same e-service system, and the crisis preparation level could be marked.

Due to the high cost of programming and tool development, only the general idea of a better e-service design can be offered. Moreover, this will need further work, future investigation, and governmental decisions to continue development and testing. This new e-service can have many other possible development perspectives and research directions.

At least four directions can be brought out:

a) Individual and independent connectivity capability

All the e-services can work until there is electricity and the internet. Therefore, e-services need connectivity, mobile internet, or Wi-Fi, adding all the tech infrastructure. When a colossal crisis happens, there must be a solution and plan to continue offering needed e-services.

The new era uses drones, blockchain, cloud-based services, decentralized solutions etc. For example, in Japan, “As a means of communication with district residents during disasters, LINE is used, which is one of the social networking services” (Takeyasu Suzuki, Takanori Watanabe, Shin’Ichiro Okuyama, 2019). All technological preparation could be supported according to crises action plans, local government, and apartment associations, who must make these investments, for example, electricity, connectivity, drones, internet solutions, alternative heating systems, etc. There are already different support funds for apartment associations for such investments.

The next research direction could answer questions on how to maintain e-services provision in crises.

b) connect with other private-owned databases and web-based programs

One development perspective could be to connect created e-service, its tools, and database with all other private owned apartment associations web pages, databases, and management programs. There are many private web-based programs for apartment associations.

For example, a very popular is Korto solution in Estonia. This is used for notices and voting, settlement history, maintenance log, documents, all the water, and other readings, invoices, and budget management. Korto has different packages for apartment association managers, accountants, and management companies (Korto, 2023).

Korto solution has today already 5376 houses in the system in Estonia (Korto, 2023). It is said that the Korto system has many pluses for apartment associations, it means "easy communication between residents, easy to collect consumption sample, continuous review of debtors, documentation of activities, continuity when changing people and cheaper than hiring an accountant” (Korto, 2023). These are different activity, but can be integrated to the new e-service. For management companies, it means "automated invoices and accounting, integrations with banks and e-services, problem procedure and notification of owners, planning and documentation of activities, more trusting relationship with the apartment association and competent user support" (Korto, 2023).

Example view of Korto solution view:

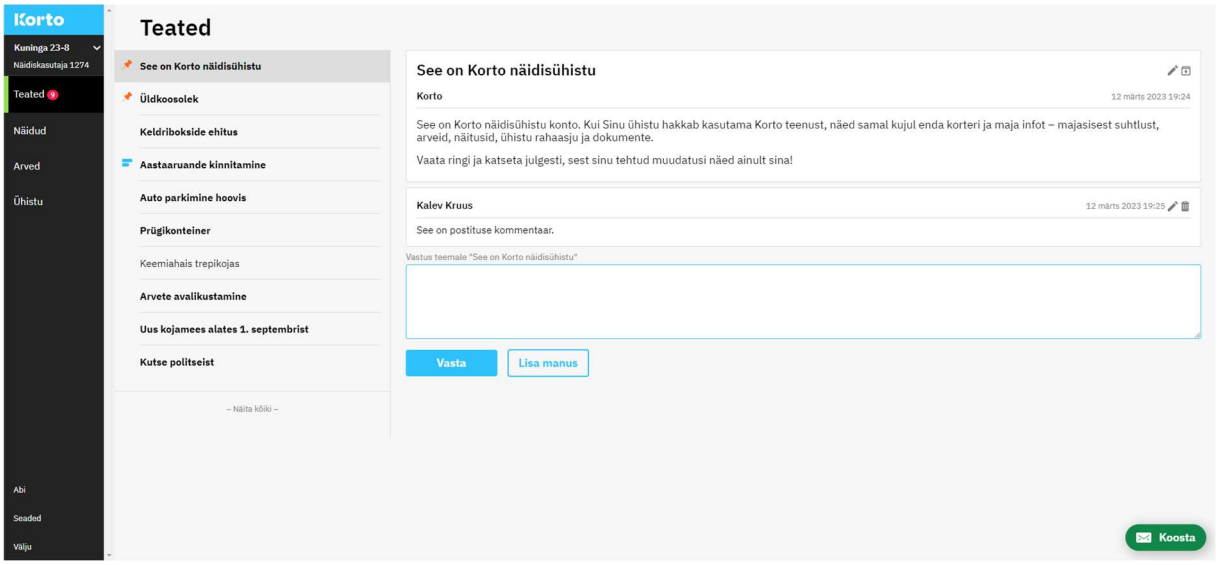


Figure 18: Example of Korto solution [1]

Local governments system has many advantages, which are described in this work, and citizens trust the Rescue Board or local municipalities. Most data can be shared with local governments database, and some can be sent vice-versa, for example, messages, public decisions, apartment association`s status etc.

c) Artificial Intelligence and machine learning usage

As brought out by experts, the human workforce in crises is limited, and they cannot be in many places at the same time, therefore in the development of new e-services, there can be usages of artificial intelligence and machine learning to reduce the human workforce need.

For example, chatbots, as it is a part of AuroraAI solutions in Finland. As mentioned, “young people especially can find it difficult to articulate their skills, and the trialled chatbot, which facilitates discussion-based profile development, was found to be an effective way to identify personal interests and motivations” (Aleksi Kopponen, Niko

[1] https://korto.ee/private

Ruostetsaari, 2019). In a crisis context, artificial intelligence can be used to identify keywords used, make automated phone calls, personal profiles and preregistered competences, all available personal information, health needs, transportation sharing, calculate best trajectories for evacuation etc., chatbot advising on multilingual speaking mode. In some circumstances, artificial intelligence does not always have to work but can be activated in crisis.

Artificial intelligence program code could be activated in crisis according to the action plan, meaning robot phone calls, email letters to citizens in different houses, information about sheltering, transportation points, even printing actions etc. This work could be activated after the decision to evacuate. This also means that information sharing, and communication can be done without human intervention. This can be the following research questions, how to use this new technology.

d) Cooperation and role of non-profit organizations

Many non-profit organizations could have more certain roles in different crisis management. For example, in Estonia, there is an organization “Eesti Naabrivalve” (Estonian Neighborhood Watch), which aims to build up safety in home areas, but can successfully start to help solve critical situations. “Cooperation between neighbours is the cornerstone of regional security. With the help of a neighbourhood watch, it is easier to get to know your neighbours, so it is easier to notice the suspicious activity of strangers. Neighbourhood watch posters and stickers distinguish your area and make your activity visible to others “ (Naabrivalve, 2023). This possible cooperation with created new e-service could be the next research direction.

8 Summary

The objective of this master's thesis is to investigate how to improve digital cooperation between local governments and apartment associations to prepare for crises. During the research, to find a solution and answer questions, the author conducted a workshop with elderly local people, met with experts, analysed different secondary data sources, and proposed a new e-service. The author evaluated the new e-service during the interview with the Estonian Rescue Board crisis management expert. The research looks into the Kristiine district case study, which is one of eight districts in Tallinn, the capital of Estonia. The author used the Action Design Research method and followed the principle of practice-inspired research. The main problem to solve is to get an overview of all the apartment associations in the district, and their needs, mapping all the vulnerable people in the district together with categorizing what are their living conditions and needs in the possible crises, getting direct contact with people, and together planning crisis plans and development.

As a result of the research, the author proposed a new e-service for local municipalities and apartment associations, which could help better prepare for different crises and manage communications during the crises. It will be an online e-service. Before the beginning of a new crisis, for local governments, this would help to create a complete overview of their municipality's apartment associations, an overview of vulnerable people who live in these buildings and would need some specific help in various crises, their location, health, and details about their possible evacuation plan. For apartment associations, it would give a tool to manage their household from one window and, in cooperation with the local municipality, help develop its building in preparation for different crises. It is planned to use different existing state e-databases to get a complete overview of the area's apartment associations, and the e-service and its application are integrated with X-road. During crisis management, it would help to prioritize crisis solving and work and give direct contact with all the citizens in the area.

The owner of the e-service is the Estonian Republic, belonging to the field of work of the Ministry of the Interior. As the author proposed, the e-service could have three different levels of development and many future research directions.

The research results confirmed that it is possible to use already existing Estonian e-state services and databases to create a new e-service to help to manage possible future crises and save lives in cooperation between apartment associations and local municipalities.

References

Aleksi Kopponen, Niko Ruostetsaari. (2019). *AuroraAI – Towards a humancentric society. Development and implementation plan 2019–2023 based on the preliminary study on the Aurora national artificial intelligence programme.* Helsinki: Ministry of Finance.

Allik, H.-L. (2021, 02 22). *Series of flops or how HOIA failed.* Retrieved from news.postimees.ee: https://news.postimees.ee/7185647/series-of-flops-or-how-hoia-failed

Apartment Associations Act. (1995, 08 03). *Riigi Teataja.* Retrieved from Apartment Associations Act: https://www.riigiteataja.ee/en/eli/523122015010/consolide

Bert Bosseler, Mirko Salomon, Marco Schlüter, Matteo Rubinato. (2021). Living with Urban Flooding: A Continuous Learning Process for Local Municipalities and Lessons Learnt from the 2021 Events in Germany. *Water, 13*(19), 2769. doi:https://doi.org/10.3390/w13192769

Distel, B. (2020). Assessing citizens' non-adoption of public e-services in Germany. *Information Polity: The International Journal of Government & Democracy in the Information Age*, 339-361.

e-Business Register. (2023, 02 12). *Centre of Registers and Information Systems*. Retrieved from e-Business Register: https://www.rik.ee/en/e-business-register

Eesti Korteriühistute Liit. (2023, 03 26). *ekyl.ee*. Retrieved from History of housing cooperatives in Estonia: https://ekyl.ee/en/organisation/housing-cooperatives-in-estonia/

e-estonia.com. (2023, 03 21). *e-estonia.com.* Retrieved from x-road: https://e-estonia.com/solutions/interoperability-services/x-road/

e-Governance. (2023, 05 06). Retrieved from e-estonia.com: https://e-estonia.com/solutions/e-governance/government-cloud/

Emergency Act. (2017, 07 01). *Emergency Act.* Retrieved from Riigi Teataja: https://www.riigiteataja.ee/en/eli/513062017001/consolide

Estonian Rescue Board. (2023, 02 21). *Be Prepared!* Retrieved from What to do in a crisis situation: https://www.olevalmis.ee/files/2022-12/ole-valmis-2022-eng.pdf?61d9cef5d8

Hatchakorn Vongsayan, Viengrat Nethipo. (2021). The Roles of Thailand's City Municipalities in the COVID-19 Crisis. *Contemporary Southeast Asia*, 15-23.

Irve, M. (2023). Kriisireguleerimise ja elanikkonnakaitse alane teabepäev kohalikele omavalitsustele elutähtsate teenuste osutajatele. *Kriisireguleerimine Tallinnas* (pp. 1 - 12). Tallinn: Tallinn Municipal Police Department.

Jakson, E. (2019, 03 26). *lounaeestlane.ee/.* Retrieved from Naiskodukaitse mobiilirakendus topis esimeste hulgas: https://lounaeestlane.ee/naiskodukaitse-mobiilirakendus-topis-esimeste-hulgas/

Kamberi, F. (2021). COOPERATION BETWEEN COMMUNITY AND LOCAL GOVERNANCE - A COMPARATIVE STUDY OF MUNICIPALITIES OF PRISTINA REGION. *Balkan Social Science Review*, 263-283.

Korto. (2023, 03 12). *korto.ee*. Retrieved from korto.ee: https://korto.ee/public

Local Government Organisation Act. (2023, 05 04). *Riigi Teataja.* Retrieved from Local Government Organisation Act: https://www.riigiteataja.ee/en/eli/509012014003/consolide

Mahmood Nekoei-Moghadam, Mohammadreza Amiresmaili, Zeynab Aradoei. (2016). Investigation of obstacles against effective crisis management in earthquake. *Journal of Acute Disease*, 91-95.

Markko Liutkevičius, Sadok Ben Yahia. (2022). Research Roadmap for Designing a Virtual Competence Assistant for the European Labour Market. *Procedia computer science*, 2404-2413.

Martha Therese Gjestsen, Siri Wiig, Ingelin Testad. (2017). What are the key contextual factors when preparing for successful implementation of assistive living technology in primary elderly care? A case study from Norway. *BMJ open*, e015455-e015455.

Maung K. Sein, Ola Henfridsson, Sandeep Purao, Matti Rossi, Rikard Lindgren. (2011). Action Design Research. *MIS Quarterly*, 37-57.

Miles Herrera, Jos van Hillegersberg. (2016). How to Define Lean IT Services Organization Wide – An Action Design Research. *Proceedings of the European Conference on IS Management and Evaluation* (pp. 223-231). Evora: ECIME.

Ministry of the Interior. (2023, 05 03). *siseministeerium.ee*. Retrieved from Ministry of the Interior: https://www.siseministeerium.ee/elutahtsad-teenused

Naabrivalve. (2023, 04 11). *naabrivalve.ee*. Retrieved from Eesti Naabrivalve: https://naabrivalve.ee/

Patricio E. Ramírez-Correa, Jorge Arenas-Gaitán, F. Javier Rondán-Cataluña, Elizabeth E. Grandon, Muriel Ramírez-Santana. (2023). Adoption of social networking sites among older adults: The role of the technology readiness and the generation to identifying segments. *PLoS One*, e0284585-e0284585.

Patricio Ramirez-Correa, Elizabeth Eliana Grandon, Muriel Ramirez-Santana,Jorge Arenas-Gaitan, F. Javier Rondan-Cataluna. (2023). Explaining the Consumption Technology Acceptance in the Elderly Post-Pandemic: Effort Expectancy Does Not Matter. *Behavioral sciences*, 87.

Raag, T. (2023, 01 31). *Ajaleht Pealinn*. Retrieved from orteriühistud saavad aprillis taotleda raha erinevateks varjumiskindluse parandamise töödeks: https://pealinn.ee/2023/01/30/korteriuhistud-saavad-aprillis-taotleda-raha-erinevateks-varjumiskindluse-parandamise-toodeks/

RIK. (2023, 05 07). *Service fee rates.* Retrieved from RIK: https://www.rik.ee/en/e-business-registry/service-fee-rates

Siseministeerium. (2017). *ULATUSLIKU EVAKUATSIOONI KORRALDAMISE ÕIGUSLIKUD ALUSED.* Tallinn: The Ministry of the Interior of Estonia (Estonian: Eesti Siseministeerium).

Sorin Burlacu, Simona Roxana Patarlageanu, Amelia Diaconu, Ghenadie Ciobanu. (2021). E-government in the Era of Globalization and the Health Crisis caused by the Covid-19. *SHS Web of Conferences*, 8004.

Sotsiaalkindlustusamet. (2023, 02 06). *Sotsiaalkindlustusamet*. Retrieved from STAR: https://sotsiaalkindlustusamet.ee/spetsialistile-ja-koostoopartnerile/star

Sterling, L. S. (2009). *The Art of Agent-Oriented Modeling.* London: The MIT Press.

Takeyasu Suzuki, Takanori Watanabe, Shin'Ichiro Okuyama. (2019). Facilitating Community Risk Communication for Wide-Area Evacuation during Large-Scale Floods. *Int. J. Environ. Res. Public Health*, 2466.

Tallinn City. (2022, 10 20). *Delfi.ee*. Retrieved from Linn aitab korteriühistutel võimalikeks kriisideks valmistuda küsimustikuga:

https://www.delfi.ee/artikkel/120085948/linn-aitab-korteriuhistutel-voimalikeks-kriisideks-valmistuda-kusimustikuga

Tallinn Municipal Police Department. (2022). *Abistav küsimustik korteriühistu juhtidele valmistumisel elutähtsate teenuste katkestuseks.* Tallinn.

Taruta, S. (2022). Management of housing and communal services in apartment building: evaluation of alternative methods. *Omsk Scientific Bulletin. Series Society. History. Modernity*, 138-146.

tehik.ee. (2023, 06 02). Retrieved from Sotsiaalteenuste ja –toetuste andmeregister STAR: https://www.tehik.ee/sotsiaalteenuste-ja-toetuste-andmeregister-star

Triin Raag, Galina Danilišina. (2023). Eesti kriisireguleerimise valdkonna tulevik. *Kriisireguleerimise ja elanikkonnakaitse alane teabepäev kohalikele omavalitsustele elutähtsate teenuste osutajatele* (pp. 1 - 15). Tallinn: Riigikantselei.

United Nations. (2023, 03 09). *World Population Prospects: The 2017 Revision, Key Findings and Advance.* Retrieved from United Nations: https://population.un.org/wpp/publications/files/wpp2017_keyfindings.pdf

Vasilis Kontogiannis, Dimitris Manousos, Ioannis Karatzanis, Panagiotis Argyropaidas, Angelina Kouroubali. (2017). Innovative technologies to support appropriate accommodation in emergency shelters. *2017 4th International Conference on Information and Communication Technologies for Disaster Management* (pp. 1-6). IEEE.

Wooseok Kang, Narang Park, Wookjae Heo. (2021). Improvements in Evaluating Grids for Basic Living Infrastructure: The Case of Gwangjin District in Seoul, South Korea. *Soc. Sci.*, 26.

Appendix 1 – Workshop Questions

Language: Estonian
Date: 16th of January in 2023 at 13 PM
Time: approximately two hours
Place: Kristiine Social Center in Sõpruse street 5.
There were 30 participants.

All the questions were printed out on paper.

Introduction:

Q.1. Age.
Q.2. Gender.
Q.3. Place of residence.
Q.4. Do you live in apartment or private house?
Q.5. If you live in apartment, then on which floor do you live:
Q.6. Do you live alone or together with someone?
Q.7. If you live together with someone, how big is your household?
Where do you get information about what is happening in your home area today?

Evacuation:

Q.8. Have you ever been forced to leave home due to some accident or danger?
Q.9. if yes, then what happened:
Q.10. Do you have a place to go in case of danger today (evacuate out of town)?
Q.11. Lately, how often have you thought that a large-scale evacuation is possible due to an emergency?
Q.12. In case of evacuation, would you contact the crisis team yourself or you wait to be contacted?

Q.13. Are you willing to leave your home immediately in the case of a emergency evacuation?

Q.14. What kind of transportation would you prefer to use to evacuate yourself from the city?

Q.15. Would you be able to evacuate yourself without any extra help to the designated location in emergency crisis?

Crisis management:

Q.16. Are you aware of the locations of public shelters in the city of Tallinn?

Q.17. Do you know the phone number to call in case of danger?

Q.18. Whom would you trust the most in an emergency crisis?

Q.19. What information do you expect during the event of an emergency evacuation?

Q.20. From where would you like to receive information about an emergency or large-scale evacuation?

Q.21. Do you have food crise reserve at home?

Q.22. Are you ready for volunteer work during a possible emergency crisis in the city?

Q.23. Please name other problems would arise in evacuation crisis?

Apartment associations:

Q.24. Do you have a shelter in your household (such as a basement)?

Q.25. Do you live in a place where you are officially registered?

Q.26. Are you ready to voluntarily share information about the crisis with your neighbors and acquaintances?

Q.27. How do you communicate and share information in a home apartment association today?

Q.28. Do you communicate everyday with neighbors?

Q.29. Do you know other people in your living area, who are not able to evacuate themselves in possible emergency crisis?

E-governance and technical readiness:

Q.30. Have you used the "Ole valmis!" mobile application?

Q.31. What kind of e-services do you use every day?

Q.32. Do you have a car in your household?

Q.33. What kind of telephone do you use?

Q.34. Do you use the Internet every day?

Q.35. Do you have an e-mail account?

Q.36. Do you use eesti.ee e-mail account?

Q.37. Do you use social media account?

Q.38. If you use social media, which platform do you use (comments).

Q.39. What kind of other technical support would you need during a crisis to better cope with it?

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