



Inclusive Emergency Planning: Guide for Addressing the Needs of Visually and Physically Impaired Individuals

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The purpose of this thesis is to develop a guide with two parts for emergency safety that consider visually and physically impaired individuals. The first part of the guide helps consider the target individuals when creating a safety plan for public spaces or services. The second part of the guide assists in the creation of an evacuation map that considers the same individuals. This emergency map gives an example product for the stakeholders of the commissioner to implement according to their specific needs. The commissioner of this thesis is Erasmus+ RDI project SAFE.

This thesis is conducted as a development project. Existing information on emergency safety and visual and physical impairments serves as a theoretical framework. Interviews were conducted with the target individuals. The data collection uses a combination of semi-structured interviews and practical walkthroughs to gather insights from the target demographic, ensuring that the guides address real-world challenges and needs. The collected information naturally separates into three different categories in safety planning. Therefore, thematic reviews were used to analyze the information.

Key findings revealed gaps in current emergency planning practices. Some of the characteristics of a normal safety plan can translate to the specific needs of the target individuals, but in some instances, reaching safety or the availability of how to reach it, for these individuals is difficult or not available at all. The implications of this research can increase the consideration of the target individuals and improve safety standards and inclusivity in public emergency planning. Future research could explore the implementation and effectiveness of the guide in diverse settings, further contributing to the field of inclusive emergency preparedness.

Keywords: Accessibility, Emergency plan, Visually impaired, Physically impaired

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1 Introduction

There is a significant lack of focus on the unique challenges faced by the visually and physically impaired during emergencies. My hypothesis is that current emergency planning protocols inadequately cater to the needs of visually and physically impaired individuals, and specialized planning can significantly enhance their safety and autonomy in emergency situations. Individuals with visual impairments might not be able to read an emergency plan, or evacuation map or see some of the emergency signs that an individual with a normal vision takes for granted. The same goes for individuals with difficulties in movement. If in case of a fire, evacuation needs to happen, but if the evacuation routes are behind staircases, safe exiting can be out of reach without assistance. These are the reasons that special consideration for visually and physically impaired individuals is needed in emergency planning.

The commissioner of this thesis is a Research, Development, and Innovation project called SAFE, which Laurea is part of. SAFE stands for Sustainable, Accessible Future Environments. The project is co-funded by the ERASMUS+ program of the European Union. This thesis is a development project whose purpose is to create a guide that the SAFE project stakeholders could use to increase the inclusion of individuals with impairments in their services.

This thesis aims to develop strategies and tools tailored for these individuals and to create a guide that enhances the inclusion of visually and physically impaired individuals in emergency planning. The methodology in this research combines qualitative analysis of existing emergency protocols with the development of innovative, accessible emergency planning tools. A significant component of this thesis is the creation of an evacuation map specifically designed for visually and physically impaired individuals, alongside a comprehensive guide for emergency planners.

This thesis is structured to first provide a thorough analysis of existing emergency planning protocols, followed by a detailed presentation of the developed tools. Subsequent chapters focus on the implementation and potential impact of these tools in real-world scenarios.

The primary focus is on urban environments in developed countries, with the intention of providing a model that can be adapted to other contexts. The guide is limited to buildings that are already built, therefore consideration of physical adjustment of the building is not given. The guide should be used in addition to a rescue plan. The guides alone are not a complete rescue plan or give enough information to create a complete rescue plan. The user of the guide should have sufficient knowledge of creating a rescue plan without these

instructions and use the instructions on the guide as additional information. Decrees, laws, regulations, and standards on rescue planning and safety still apply.

2 Inclusion of Visually and Physically Impaired Individuals in Emergency Planning

Visually and physically impaired individuals can face difficulties in emergencies or in the preparations for such events. For the given individuals, evacuation from a building can be more challenging than for individuals with normal visual and physical capabilities, or not possible at all. Navigation and maneuverability can be challenging for these individuals. Therefore, the importance of preparation and prevention of such events is highlighted.

Emergency planning only considers these impaired individuals in cases where the facility is intended for such individuals or it is common, that these individuals with impairments reside on the premises. Some of the safety measures translate to the special needs of impaired individuals, but some of the precautions and actions are completely unavailable.

2.1 Emergency Planning and The Related Acts, Laws, and Regulations

Emergency plans are made to advance the safety of people and to reduce accidents. In Finland, this is regulated by the Rescue Act (379/2011). The Rescue Act (379/2011) regulates on the peoples, companies, communities, and legal entities' responsibility to prevent fires and other accidents, how to prepare for accidents and the actions done when accidents happen, limit the consequences of accidents, build, and maintain civil defense shelter and to participate on rescue operations and civil defense training.

Rescue Act (379/2011) Section 14 on Self-preparedness gives out the responsibilities that the owner and occupants of a building must do themselves to prevent accidents. These actions in the Rescue Act (379/2011) are: “1) prevent fires and other dangerous situations; 2) prepare for the protection of persons, property and the environment in dangerous situations; 3) prepare for extinguishing fires and taking other such rescue action which, they are capable of performing independently; 4) take measures to ensure safe exit during fires and in other dangerous situations and to facilitate rescue operations.”

Government Decree on the Emergency Services (407/2011) describes when and where a rescue plan needs to be made. These sites are for example residency buildings with more than three residential apartments, churches, libraries, shopping malls that are more than 400 square meters, workplaces with usually at least 50 people, and other public and private spaces.

Public events that have certain characteristics need a rescue plan. If the event has a minimum of 200 occupants simultaneously, pyrotechnics or fire is used, the usual exit arrangements are not applicable, or the nature of the event poses an elevated risk of danger to humans (Government decree on the emergency services (407/2011)) a rescue plan is required. The owner or manager of the property is the one responsible for making the rescue plan.

Regulations to consider visually or physically impaired individuals only consider buildings that typically house or take care of individuals with impairments, such as care institutions, service, and supported housing. Section 18 of the Rescue Act (379/2011) regulates on what is needed in such institutions. These institutions must in advance create a plan where its residents can be evacuated during a dangerous event.

The following sections 19, 20, and 21 of the Rescue Act (379/2011) regulate on the plan for the given residencies. The plan needs to be drawn up in a report before the operation of the facility can start and must be updated every three years or when changes to the functions of operation are made. The plan must be accepted by a regional rescue authority that assesses if the evacuation plan provides sufficient assurance that the residents of the occupied facility can be rescued. If the plan is not accepted, operation in the facility cannot start. Special considerations to the given individuals when making a rescue plan are not regulated or typically done in other types of buildings, spaces, or events.

2.2 Consideration of Visual Impairment in Rescue Planning.

According to the World Health Organization (2023), visual impairment occurs when an eye condition affects the visual system and its vision functions. Usually for individuals with visual impairment, some level of sight is left. According to Tolkkinen (2021, 10-11), of the National Institute for Health and Welfare, 73,3% of all visually impaired individuals in Finland have, by the World Health Organization's definition, "Low vision". Visual impairment can affect individuals' ability to function during an emergency.

Individuals with visual impairments can do some of the procedures needed to prepare for emergencies to the same level that people with normal visual abilities can. According to a report from the Federal Emergency Management Agency (1999, 11) of the United States Fire Administration: "Sight is the primary sense for processing information contained in the environment. Loss of this sense may predispose an individual to ignite a fire accidentally or sustain an injury from an already-lighted fire. Further, people who are blind or visually impaired may be more susceptible to cooking accidents, or to leaving a heater too close to a flammable object." For individuals with disabilities, preparedness for emergencies is even more important. Therefore, the instructions for them should also be clear and accessible.

The rescue plan should be documented so that a visually impaired person can plan their protocol in case of an emergency beforehand. This can be done using braille for typing in a physical rescue plan, by having someone to guide the visually impaired person through a rescue plan, by having a digital document available that can be read out loud with a text-to-speech function or by having a rescue plan video available that has clear audio instructions. It should also be noted that most blind individuals cannot read braille, so raised letters, numbers, and signs should be used in the instructions (Sorensen 1979).

Emergency exit routes should be planned to consider visually impaired individuals before an emergency occurs and must not be blocked or obstructed by any objects. A planned exit route should be assisted with visual or physical cues. The Decree of the Ministry of the Interior marking and lighting the exit routes of buildings (805/2005) is a standard on what needs to be marked, how, and when. Bright lights that guide the direction one should navigate towards, and floor markings that navigate towards the exit, such as elevated control strips on the floor or bright arrows, can be used to aid in navigation. SFS-EN ISO 7010:2019 gives standards for safety signs.

2.3 Consideration of Physical Impairment in Rescue Planning

Physical impairment can mean various things. International Classification of Function, Disability and Health (2023) describes impairment in body functions as: “Impairments are problems in body function or structure as a significant deviation or loss”. In this context, it means individuals with physical disabilities that affect their movement. The disability of movement can range from lowered walking speed or reduced mobility to complete loss of walking ability. Therefore, when making a rescue plan, individuals with no ability to maneuver over level changes should be considered.

The layout of the building highly affects the details that need consideration for individuals with disabilities when creating a rescue plan. If the building is a one-story building with two exits on both ends of the building, that are wheelchair accessible, no special planning is required for the evacuation. But if the building is a multiple-story building, with an elevator that doesn't operate during a fire, or the emergency exits are not accessible by individuals with physical disabilities, special consideration is needed. The most effective precautions in these types of situations are part of the physical structure of the building, for example, fire doors, fire-resistant walls, rooms or spaces, and sprinklers.

If a person cannot escape the building during an emergency, other means of survival are important. Therefore, preparation on an individual level is important. The instructions for emergencies should be easily available in the building. The Finnish National Rescue Association (2019, 11) in their report, recommends the evacuation map to be available in spaces where the evacuation route can be hard to understand. The evacuation map should

also be on a level that can be easily interpreted by someone in a wheelchair. The Finnish National Rescue Association (2019, 11) recommends this to be no higher than 1,4 meters from the floor.

When exiting the building safely is not possible due to disability or any other means, a building should have an additional option for its occupants to stay safe during a fire until the rescue services can assist with an escape. This is done with compartments that subdivide the building to prevent the fire from spreading. The decree of the Ministry of the Environment on the fire safety of buildings (2002) regulates the specifications that are needed to make fire compartments for specific buildings.

3 Implementation

This Thesis was done as part of a Research, Development, and Innovation project where Laurea is a part of. The project is called SAFE, and it stands for Sustainable, Accessible Future Environments. The SAFE project is co-funded by the ERASMUS+ program of the European Union. The project's purpose is to build new ways to create sustainable solutions to make spaces and services more accessible and inclusive. This thesis was done as a development project. Therefore, the goal is not to find new information through research but rather to use existing knowledge to create something new and beneficial. "Functional thesis is not only about solving practical problems based on your knowledge and skills. It's about a journey traveled together with other professionals, customers, or users, where you gather the knowledge and skills of all parties." (Kostamo 2022) The existing knowledge used included various government acts, laws, and decrees, and other trustworthy literature on accessibility and disabilities.

To ensure reliability, gain perspective, and feedback to reflect on, semi-structured interviews with representatives from both target groups were used. A walkthrough of an emergency plan was done with the representatives to gain an understanding of what is needed from the individuals in an emergency. A checklist was used as a tool during the walkthrough to collect data and record the findings. All three methods were used in conjunction.

The result of this thesis is a concrete product. The product, when used, increases inclusion in safety planning and preparation for emergencies. Through this, the project stakeholders can increase the safety and the feeling of safety in their services or spaces.

3.1 Development Project

I got involved in the SAFE project through our teacher when I was looking to find a subject for my thesis. Developing a more inclusive and safer environment for everyone is part of the field

I am studying, so I agreed to be part of the project. The subject for my thesis was suggested by one of the teachers in the project. To create instructions or a guide on what to do, something concrete must be done, and not just tell the theory. Therefore, a development project was the natural option for this thesis.

In a functional thesis, the writer shows their professional expertise with a product and a report that is made to create a concrete object or an event in a justified way (Kostamo 2022). In a development project, the research doesn't tell what needs to be done but gives information on what is done and how it is done. In a research project, the goal is already known and the research findings are not the result of the thesis, but part of it. To create a guide that is based on professional information, knowledge of the subject needs to be gained.

3.2 Data Collection

To gain a perspective and increase reliability, individuals with impairments, both visually and physically impaired individuals were interviewed. The person with visual impairment will be referred to in this thesis as P1 and the individual with physical impairments will be referred to as P2. Their identity will not be revealed here to respect their anonymity. This was predetermined and disclosed to the individuals, before conducting interviews with them so I could receive honest answers. "Confidentiality and anonymity foster trust and respect between the researcher and participants which positively impacts the data collection process in studies." (Kang, 2023)

A specific location was used to conduct a walkthrough. First walkthrough was performed on the 16th of November 2023 and the second one on the 29th of November 2023. The purpose of the walkthroughs was to assess how the target individuals can use an existing emergency plan if one exists, and how, what they could do in an emergency, and how well the existing emergency route and indications to such translate to their specific capabilities.

Semi-structured interview assisted with a checklist was used to help with data collection during the walkthrough. Neha (2021) states that the use of a checklist allows precise data to be collected and that a record of a process can be quickly collected this way. The checklist was used to ensure that important information or steps in evacuation or emergency planning are not missed. Data for the checklist was collected from existing literature on emergency planning and from literature addressing the needs of visually and physically impaired individuals. The checklist will also be used to collect and store the information gained from the walkthrough. The three previously mentioned data collection methods were used simultaneously but will be further explained in the next chapters separately.

3.2.1 Interview

To receive accurate information, interviews were conducted with participants from both target groups. The interview was conducted as a semi-structured interview because this allows the interviewer to ask open-ended questions that are designed in advance, further, this allows other questions to emerge (DiCicco-Bloom & Crabtree 2006, 315). The questions that were designed in advance were based on literature that was studied beforehand. Other options for the interview format would have been structured or unstructured interviews. A structured interview was not selected because they often produce quantitative data and unstructured interviews are often used in a manner where the interviewee observes behavior from the sidelines (DiCicco-Bloom & Crabtree 2006, 315). I deemed these to be ineffective formats for collecting information since I needed to hear, learn, and confirm information from the target group representative.

The interviews were conducted at a public space where the individuals could visit. At the site, a walkthrough was performed to mark out some of the characteristics that could emerge during an evacuation. The result of the interviews confirmed some of the points that were learned from previous literature and therefore the method was deemed effective.

The semi-structured interview was assisted with a checklist that was filled out before the interview was conducted. The information/questions used in the checklist were partially based on decrees, regulations, and laws as well as other existing information on emergency evacuation for my target group. The questions were asked in a way that they would leave room for discussion and observations to the point given.

3.2.2 Checklist

To collect data a Checklist was used. A checklist is a collection of points or questions that are gone through one by one to verify crucial questions. Checklists also remind the researcher of the need for a systematic approach (Barbour 2001, 1). A checklist was deemed appropriate, so important points in emergency planning or in the process of evacuation would not be missed. The checklist also helped with the interview as mentioned previously. Below are the checklists that were used.

Visually impaired				
Observation	Yes	No	N/A	Notes
Evacuation plan in an accessible place.				
Evacuation plan audiovisual				
Braille in evacuation plan if physical or raised route indication				
Evacuation plan otherwise available				
Exit signs				
Exit signs visible				
Instructional signs, floor numbers. If yes, are they visible				
Contrast changes in important places				
Other visual cues				
Accessible evacuation route				
What dangers are there				
Elevation changes indicated with color changes				
Easy to use doors				
Two exit routes				
Are they accessible				
If no 2 exit routes, is there a space to evacuate to				
Is assistance needed or available				
If there is assistance is it prepared/educated to help someone with special needs				
Other observations				

Figure 1: Checklist for the visually impaired Individual.

Physically impaired				
Observation	Yes	No	N/A	Notes
Evacuation plan				
Evacuation plan on height that can be read /otherwise accessible				
Exit signs				
Exit signs on visible level				
Instructional signs, floor numbers				
Other visual cues				
Accessible evacuation route				
Elevation changes blocking exit route(s)				
Handrails				
Easy to use doors				
Button for automatic door				
Above accessible				
Two exit routes				
Are they accessible				
Risks in evacuation route				
If no 2 exit routes, is there a space to evacuate to				
Is assistance needed or available				
If there is assistance is it prepared/educated to help someone with special needs				
Other observations				

Figure 2: Checklist for the physically impaired Individual.

The checklists worked as intended during the interviews. They opened room for further discussion and were a good reminder of the questions that needed to be asked and gave new topics to other discussions as well. The checklist was also an effective way of storing the information gained from the interview.

3.2.3 Walkthrough

A walkthrough was performed with representatives from both target groups. A walkthrough is a method used to test something and, in this case, it was testing emergency exiting and its procedures. In the walkthrough, a checklist was used to ensure that nothing important was missed. The walkthrough ensured that the previously used information was correct to some degree, but new observations were also discovered.

For the walkthrough with the visually impaired individual, a familiar large shop was used in the walkthrough. The information gained from the interview helped to understand and confirm what is needed in a rescue plan, so it is accessible for the given target group. New findings were also discovered during the interview on what is difficult in a typical Finnish environment.

The walkthrough with the physically impaired individual was performed in a multi-level shopping mall. This walkthrough did not give as much new information as the one with the visually impaired individual since it is easier to identify with someone with physical impairments. Even so, it gave new information and assured existing knowledge.

3.3 Guide

Two guides were made as requested by the commissioner for the SAFE project. One guide (appendix 1) was to give instructions on how the maker of an emergency plan can consider visually and physically impaired individuals in emergency planning. The second guide (appendix 2) was an example of an emergency evacuation map that can be implemented and modified according to the special characteristics of the building or service.

The information in the guides was based on both the results from the existing literature and the results from the interviews with the target group individuals. The guides were both made with Microsoft PowerPoint. The emergency evacuation map example guide is text-to-speech ready as a PDF.

4 Results

From the interviews, important information was collected on what challenges are common in typical public places in Finland and what problems the rescue plans have for visually and physically impaired individuals. The interview results also confirmed some of the information gained from the literature review conducted before the interviews. Certain themes arose from the literature review and the interviews. Therefore, thematic analysis will be used to review the results. The problems that rose to the surface can be put into these categories:

accessibility of the rescue plan and evacuation map, physical elements, and assistance in emergencies.

The visually impaired individual that was interviewed will be referred to, in the following chapters as P1 and the physically impaired as P2. To give context for the thesis reader, P1 was not fully blind, but because this is the case for most visually impaired individuals it was a suitable fit as an interviewee. P1 had some vision left but was blind to a level where most texts are impossible to read without a text-to-speech program. P1 sometimes uses a white cane to help with navigating but it is not a necessity for her. P2 was an elder individual with a breathing problem. P2 needs a walker to carry an oxygen tank and has a limited amount of strength to move around. P2 was found suitable for the interview since with these characteristics he fits into the frame of our target group.

4.1 Accessibility of The Rescue Plan and Evacuation Map

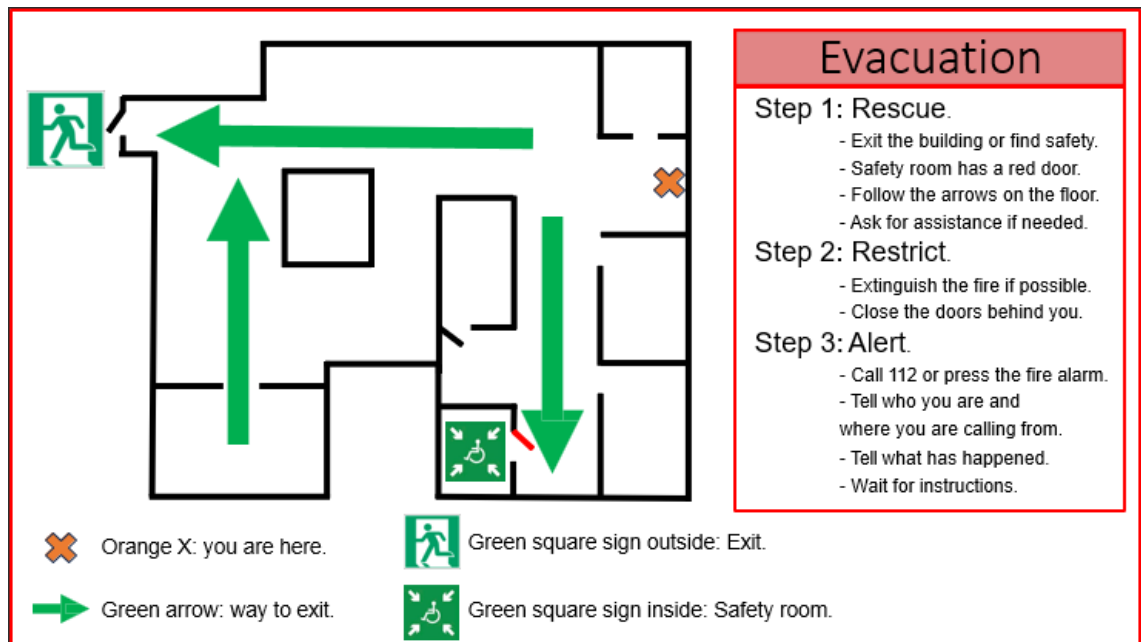
The first problem that arises in rescue planning and evacuation for the subject individuals is the accessibility of the rescue plan and evacuation map. Preparation is important for both individuals and therefore so is the accessibility of the plans and maps. If the map is available, individuals can get an idea of what to do in an emergency before it happens.

The emergency plan should have risks assessed and highlighted, especially for the target individuals. The individuals may not be able to go downstairs for example. Therefore, the instructions should have information on what to do if a safe escape is not possible. The target individuals may also cause risks for others in an evacuation situation. This can be from lowering the speed of the flow of people going out. People should be informed of these individuals if the building doesn't have special helpers to assist them, and the instructions should also give information on how to do it.

Based on the literature review and the interviews the following must be true for the plans to be accessible. The rescue plan needs to be in a form that can be listened to or can be read with braille. The evacuation map should be placed somewhere where it is easy to locate and separate from other information. Meaning that it is not for example in the information wall but separately from it. The map also needs to be at a level where it can be read from a wheelchair. Then the map needs to be big, have clear arrows for the exit route, not too many extra signs to confuse the reader, and the "you are here" mark must be separate from everything else on the map by color and shape.

All this was applied to the guide by instructing its user to have the rescue plan available in a form that can be read with a text-to-speech function. Some of the typical risks for the target individuals were also given. For the evacuation map, a separate guide was created with an

example map. The map below is an example map that the SAFE project stakeholders can use to create their evacuation map.



Picture 1: Evacuation map template.

4.2 Physical Elements

This chapter is the most important part of the evacuation plan and evacuation process. The individuals may be able to adapt to some level to the difficulties in the other chapters. But in this chapter, some steps are not possible to overcome for our individuals to gain a safe rescue without external help.

Many of the things that are normal and instructed things in evacuation planning, come short when considering our individuals. Many of these were given by the P1. One of the most important things was what was said by P1 about the exit signs:

The exit signs are high on the roof, even if they were illuminated, I would not be able to see them because when I walk, I look at the floor, and that (the roof) is where the smoke will cover the signs first anyway.

P1 gave a solution to this by having the markings on the floor as arrows. It would also be good if the signs or arrows were high contrast color and elevated. The same goes with the floor numbers, they should be large and have high contrast color on the background, not just be white and black as they commonly are and should be placed low on the wall. During the interview, we went through an example of a rescue plan and determined Picture 1 below to be optimal for her. Picture 1 is from a rescue plan for Kiint. Oy Harjulakoti, Senioritalo

Harjulan Ainola by REIM (2016). Already at this point, P1 mentioned that evacuation from the target building would be difficult since there was no evacuation plan available, the exit signs were on the roof and the evacuation doors were hard to spot or use.



Picture 2: Floor number example.

Risks of injury are also there from some elements in the building. These particular elements were: The evacuation doors were hard to spot from the other windows raising the risk of colliding with the window, the evacuation door had a step that was not marked raising the risk of falling and even being stamped over, the escalators were not marked with a spotted line that could indicate if the escalator is moving, the exit doors were hard to use since they were hard to handle. P1 said that they would just go straight for the hammer that breaks the glass, but then also noted that the hammer was hard to locate. The last problem that this building had, that many other public and private buildings have, was that the doormats are always difficult with the white cane, even though they can indicate that the exit is close, the white cane gets often stuck in them risking the individual to fall.

Some of the difficulties that P1 faces are very difficult obstacles to P2. One example could be escalators, while this poses a danger to the blind individual since it is hard to see if they are moving or not, this is a difficult obstacle for P2. If the escalator is the kind that has moving stairs in them, it would be impossible for P2 to move on them, since the steps are so high. For a flat escalator evacuation on these is possible.

The building where our walkthrough was performed with P2 had multiple exit routes, and even when the building had multiple levels all of them were accessible for P2. It was noted during the walkthrough, that if the building was not familiar to the individual with physical impairments, it would be hard to find an accessible evacuation route since they are not separated from the evacuation routes with staircases in them. The exits with no elevation changes were only on one side of the building, far away for someone with limited energy levels and therefore hard to reach.

These were noted in the guide by explaining the circumstances where problems arise based on the literature and the interview results. Examples of solutions and characteristics of the solutions were also given.

4.3 Assistance in Emergency Evacuation

In this case, emergency assistance is help from the staff or other similar occupants that is given to our target individuals before or during an emergency. From the literature review and interviews, it became clear that helping our target individuals in preparation for emergencies or during emergencies can be very valuable. In some cases, doing a safety walk with our target audience is not reasonable since the individuals might visit the place only for a short amount of time or there might be too little staff on the premises to do the safety walk every time or other reasons. But in case of an emergency, help from staff can be very beneficial for the impaired individuals.

Assistance in an emergency can be in a form of just giving directions to where to go or walking along and assisting with navigation or maneuvering around obstacles. The help can be minimal and easy to give, but for the impaired individual it can be a big help. Even only mentioning that there is help in emergencies available for a customer with an impairment can be positive.

During a possible emergency, the staff member or whomever is doing the evacuation assistance should be aware of the limitations of the target individual and know how to act around these types of individuals. Therefore, training the individuals for the task is important. If the staff member is not trained, they could risk causing more damage to impaired individuals or could make the individual feel bad. To help someone, one of the details P1 mentioned, was that the individual helping should be doing is firstly asking if they want help. Then if the individual accepts the help they should say and describe what they are doing for example: "I am extending my arm in front of you if you want to grab it". This gives an option for P1 to choose if they want to be touched or not in a friendly manner. That way P1 is also not touched if P1 doesn't want to be touched.

From the interview with P2 it was noted that not all exit routes are accessible for P2 or for others with difficulty in moving. The signs indicating evacuation routes do not specify if the exit route is wheelchair accessible and therefore finding safety can be difficult. If the impaired individual is not familiar with the location they are in, assistance in finding an accessible exit is beneficial if the individual is not prepared for emergency exiting. Or if a wheelchair-accessible exit does not exist, help going down the stairs is needed. This can pose a risk of injury for the impaired individuals and the help for such events should be trained. Some buildings have evacuation rooms by design that can keep their occupants safe for a certain amount of time for external help to arrive to assist them in evacuation, but not all.

In the guide, it was mentioned that help for our target individuals from staff or similar individuals can be important and is likely beneficial but contains risks that should be addressed. It was said that if help is offered it should be trained. Some help from individuals with no further training can still be beneficial and can be given but the risks of it should be mentioned.

5 Discussion and Conclusion

In Finland, people with disabilities are only considered in safety planning when the building is designed for these individuals, or it is common for these individuals to use their services. Safety planning, its accessibility, and evacuation translate to some degree for the individuals subject in this thesis, but in some areas can make them completely unavailable. This thesis aimed to address an aspect of emergency planning that is often overlooked: The inclusion of visually and physically impaired individuals. For the stakeholders of the SAFE project, designing their safety planning to a degree that advances the safety of the impaired individuals, may be difficult because of the physical obstacles of a building, the guide created as a product of this thesis can increase the availability of information that is needed by the service provider and the impaired customers to increase the safety of their service or space used or offered. Even if everything in safety planning is done according to the laws, decrees, and regulations, the safety of the service or building can be increased with the help of the guide created.

From the interviews with the impaired individuals, it was determined that if the individual visited a building that they were not familiar with, it would be difficult to follow the evacuation protocol that was designed for the building. Although it is hard to include every possible scenario in a guide that is meant to be available to be used in a way that it can be adjusted to meet the specific needs of the stakeholder, information was gathered and added to the guide that can help the impaired individuals in preparation for emergencies and emergency evacuation.

The goal of this thesis was to create a guide that enhances the inclusion of visually and physically impaired individuals in emergency planning. Based on existing literature and the results from the interviews with the target individuals, solutions that can increase their safety were found and added to the guide. Because special consideration of the target individuals in rescue planning in services that are not designed for individuals with impairments is not required by law, it is now up to the stakeholders of the SAFE project and other service providers to use the guide if they find it suitable.

The guide that was created can be used in further development in more specific safety planning. However, the research is not without its limitations. The focus on certain types of buildings and the participant pool's size and diversity might not cover all possible scenarios and needs. Therefore, future research should aim to expand in these areas. Further studies could explore the application of the guide in a wider range of environments, test its effectiveness in real-world scenarios, and adapt it to cater to a broader spectrum of impairments. Additionally, research into the implementation of these guidelines in actual emergency planning processes and their impact on the safety and comfort of visually and physically impaired individuals would be valuable.

In conclusion, this thesis represents a meaningful step towards creating safer, more inclusive public spaces. It highlights the need for continued efforts in this direction and serves as a foundation for further research and development in inclusive emergency planning.

5.1 Ethics and Reliability

The sources of information for this thesis were existing literature and interviews with individuals that matched the target audience. Because existing sources of information were used, it was important to avoid plagiarism. To avoid plagiarism, the information that was used was referred to according to the Guidelines for Referencing (King 2023) of Laurea. The sources that were used were found reliable since they were laws, degrees, acts, official guidelines, and otherwise credible organizations or sources.

The information from the interviews was found reliable since the people who were interviewed were promised anonymity. The interviewees were informed about what the interview was about, what its purpose was, and how the information would be used and collected before the interview started.

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Appendix 1: Guide for rescue planning for visually and physically impaired individuals

Considering visually and physically impaired individuals in a rescue plan.

Part of a bachelor degree development thesis.

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 30.11.2023

Introduction

Purpose

- Help consider individuals with visual impairments and individuals with disabilities in movement in rescue planning.
- Create inclusive spaces and services.
- Increase the feeling of safety.

Outcome

- A more inclusive rescue plan that is accessible by visually and physically impaired individuals.
- Safer spaces for the target individuals.

Specification

- This guide is intended for buildings that are or will be in public use.
- The building where this guide can be used for is already built, therefore designing of physical structures is not considered.
- This guide applies additional information on rescue plans and is not sufficient guide to create a complete rescue plan.
- Knowledge of creating a safety plan is expected of the user of this document.
- Decrees, laws, regulations, and standards on rescue planning and safety still apply.

Commissioner

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- SAFE: Sustainable, Accessible Future Environments.
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Risks assessment

Visually impaired

- Individuals with visual impairment can have higher levels of risk in their everyday activities.
- Depending on the type of service they are using, this should be considered.
- If the service is providing accommodation, the room should have specific risks mapped for these individuals with fire safety instructions.
- If the service poses other types of risk, the risks should be managed to consider that the risk is limited accordingly. For example, the danger of falling over a ledge or touching a moving or burning object by accident.

Physically impaired

- Physically impaired can have a limited range of distance they can move at once or can't move over stairs or steps.
- This should be considered depending on the type of service provided.
- This can be for example, providing seats along the path they will be using if the service is some type of sight seeing for example.
- Placing the individuals on a floor with no elevation changes, if for example the service is accommodation, can be beneficial.

Accessibility of rescue plan and evacuation map

Availability

- For visually and physically impaired individuals, individual preparation is highlighted.
- For this preparation, information on the building and its safety features and escape routes is important.
- Rescue plan should be available for the staff of the building to give for the target individuals if it is requested.
- The rescue plan can be offered for the target individuals, if the need for this is deemed reasonable when considering the circumstances of the stay or type of service. This option should be done with caution to not risk offending the customer.

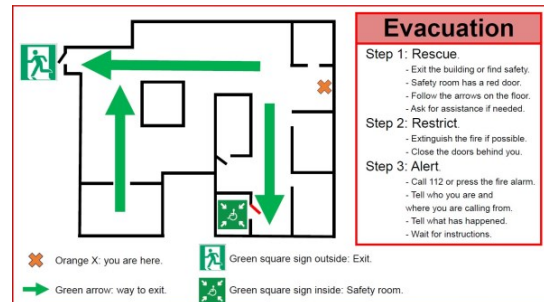
Accessibility

- Visually impaired individuals often have some sight left, but not always. For this reason, the rescue plan should be in a format that can be played with a sound i.e. text to speech function or can be read with braille.
- If pictures are used, have text describing the image.
- Same with the possible evacuation map of the building.
- The evacuation map should be done with big lettering and object markings. It should not have too many distracting markings or features.

Applying an evacuation map

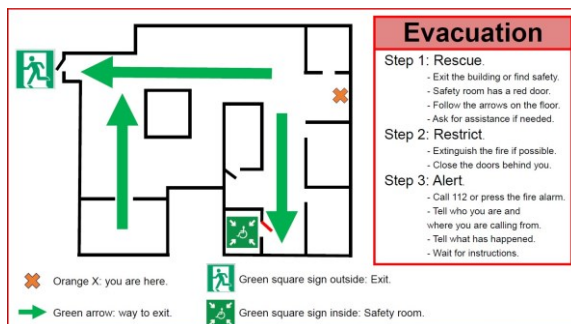
Notes for creating the evacuation map:

- Use big Letters and indicative signs.
- Use high-contrast colors.
- Have clear and big arrows to point directions.
- Separate the "you are here" symbol by shape and color.
- Explain the meaning of the signs.
- Limit the information. Too many symbols can be distracting.
- If the map is in physical form. Use raised marks for the direction arrows and walls.



Applying an evacuation map

Notes for creating the instructions for the evacuation map:



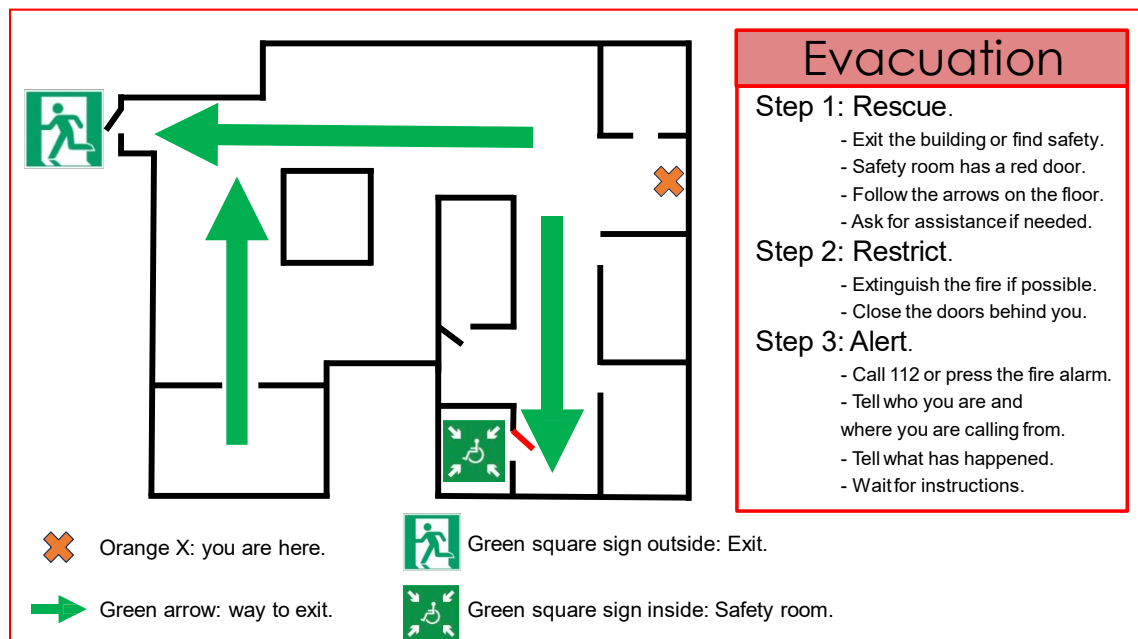
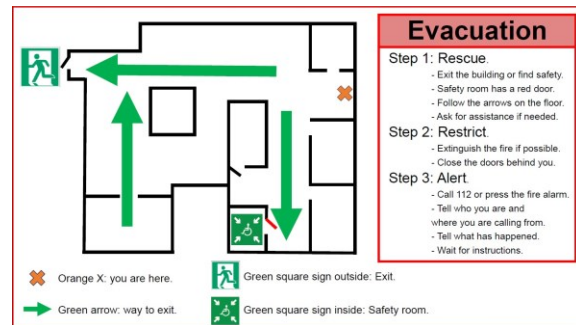
- Use big letters.
- Limit the information to be clear and precise.
- Use the following steps:
 - Step 1: Rescue.
 - Describe how to find an exit or a safety room and describe directions if needed or possible.
 - Tell to help others if possible.
 - Step 2: Restrict.
 - Inform how to stop the fire and/or how to prevent it from spreading.
 - Step 3: Alert.
 - Tell to inform the emergency services.
- Create a text that describes where the exits are if the building is large or complex.
- Have it available with text-to-speech function. Most browsers have this function available for pdf files.
- If the map is in physical form, consider having a way for playing the explanation out loud from the press of a button.
- If the map is in physical form use braille.

Evacuation map

Notes for creating the evacuation map

- Use big letters and indicative signs.
- Don't have extra signs that can distract the reader.
- Limit the information to what is needed or can be used by the target audience.
- Use high contrast colors and separate colors and shapes based on the type of information is given. i.e. mark the "you are here" sign with a different shape and color than anything else on the map.
- Explain the meanings of the signs.
- Have text-to-speech function available if possible.
- Have braille markings if possible.
- In a physical map, rise the indicative signs in the map if possible.
- Signs should be according to standards.

Evacuation map example



Evacuation

Evacuation for the target individuals can be challenging. Therefore, some characteristics should be considered to assist, or make it easier for them to evacuate.

Physically impaired

- Physical impairments come in different challenges and forms.
- Some individuals can not maneuver over steps or stairs. Therefore, the exit route or way to safety room should be clear of these or not behind these obstacles.
- Some individuals can not move fast or only for short distances. Therefore, long distances to the accessible exit or safety room should be avoided and seats for resting along the way should be considered.
- Two routes for safety should exist.
- Doors along the path to safety should be automatic or easy to open with low force and from a seated position.
- The safety route should be kept clear of any items that may block the movement.
- Safety tools should be on a level that can be reached from a seated position.

Visually impaired

- Most visually impaired individuals have some sight left, but not all of them.
- These individuals often rely on contrast, or lighting differences when navigating.
- Individuals with some sight left often look on the floor when navigating. Therefore, the rescue route sign on the roof can be deficient.
- High contrast arrows on the floor, that are raised, would be optimal for these individuals.
- Floor number should also be on a low level and with high contrast lettering and background.
- Exit doors should be easy to spot from the rest of the wall with different color.
- Safety tools should be well indicated and easy to find.

Assistance in case of emergency

Assisting

- The help from staff can come in a form of a safety walk with the impaired individual or it can be guidance or movement assistance in case of an emergency evacuation.
- The help should always be offered before doing anything. This allows the impaired individual to reject the help in a friendly way.
- The help can be just walking along the individual or by assisting with moving or directions towards safety.
- The helper should always say what they are going to do before doing that action with the target individual if help is accepted.

Training

- Individuals in the target group can highly benefit from assistance in emergency evacuations.
- However, this can be risky since it can cause more damage to the individual with physical impairments.
- The staff should be trained to help individuals with impairments, and how the helping happens.
- The training should be practiced.
- Untrained assistance can still be beneficial, but the risks of it should be known.

Appendix 2: Evacuation map for visually and physically impaired individuals

