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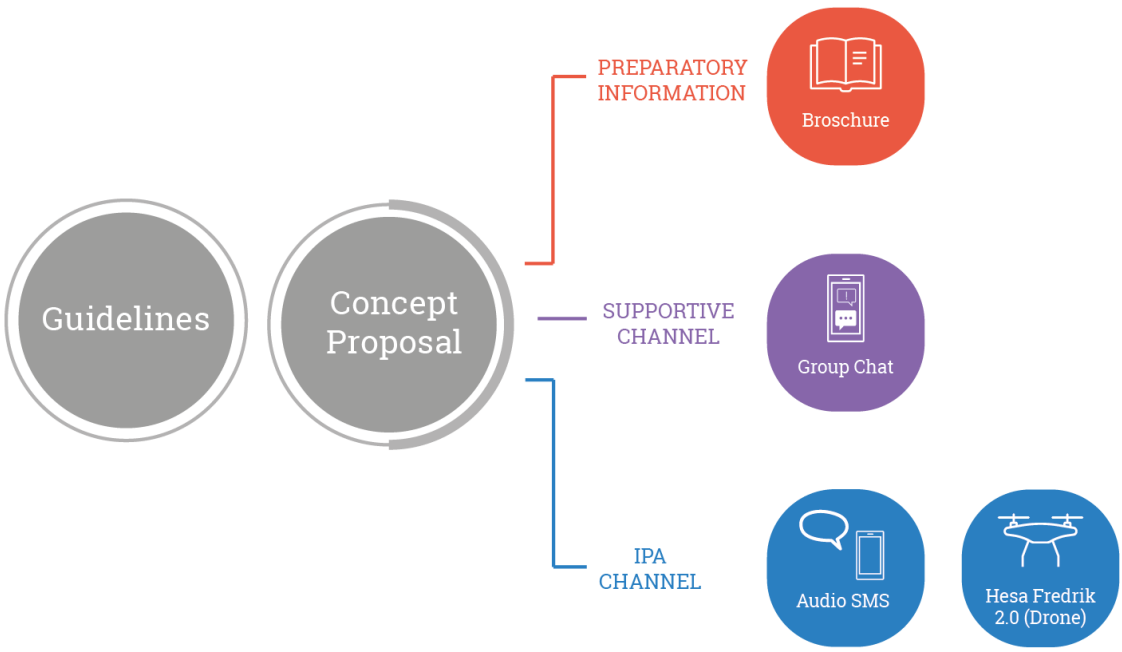

Inclusive communication of crisis information

An explorative study through participatory design with elderly

Master's thesis in Industrial design Engineering

ROSANNA HANSENÄS & SOFIA SAMUELSSON

DEPARTMENT OF INDUSTRIAL AND MATERIAL SCIENCE
DIVISION DESIGN & HUMAN FACTORS

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Department of Industrial and Material Science
Chalmers University of Technology
SE-412 96 Gothenburg
Sweden
Telephone +46 772 1000

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Illustration by Sofia Samuelsson, the final concept proposal, and guidelines.
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Abstract

With severe climate-related crises like flooding, storms, and wildfires increasing globally, authorities need to ensure that information reaches and supports all members of society. However, there is a risk that elderly, who might often have cognitive impairments, are excluded since channels for crisis information are largely based on audio and image. Using an exploratory approach, this master thesis investigated how information communicated to the elderly in future climate-related crises in Sweden can become more inclusive and create a feeling of safety. Methods for engaging the elderly in participatory research when investigating future scenarios and sensitive issues are explored and compared to reference literature and input from authorities.

The study identified (1) the elderly living alone in cities with few social contacts, (2) those with impairments or (3) those who are less digital as groups as potentially critical user groups. To guide responsible authorities to meet the needs of these groups, a combination of guidelines and concept proposals of possible future ways of communication in crisis are suggested. The concepts proposed are an automatic voice SMS, an update of the outdoor signal "Hesa Fredrik" communicated with drones to reach residents in the countryside and islands, and a chat group to support neighbourhood cooperation in crises. The concepts were described and supported with additional information in an updated version of the brochure "If Crisis or War Comes". In combination with the concepts, the guidelines can make crisis information more inclusive for all but need to be further revised and tested before implementation. In addition, the study can be used as a reference for future participatory research and investigation of methods to use when working with elderly on sensitive issues. It also opens for further exploration of simulating more severe future crisis scenarios with participants.

Keywords: *Participatory design; Elderly; Seniors; Crisis information; Crisis communication; Climate-related crises; Design for Elderly; Design for all.*

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Gothenburg, June 2022

Rosanna Hansenäs

Sofia Samuelsson

Terminology

Essential vocabularies used in this project are described below in how they ought to be interpreted in this report.

Crisis situation - Serious situation that affects a person's everyday life.

Crisis information - Information from authorities that supports citizens in handling a crisis situation.

Preparatory crisis information - Information to citizens before a crisis occurs.

Seniors - Retired people (above 65).

Elderly - People aged above 75.

IPA - Important public announcement (in Swedish: VMA, viktigt meddelande till allmänheten).

Table of content

1 Introduction

In this chapter, a brief background is given to why inclusive communication of crisis information is relevant to research and the framing of this thesis. The aim, goal, and research questions are described, followed by demarcations. After that, an account is given of how the project has taken ethical and sustainability aspects into consideration. Finally, the project process and the report's structure are described.

1.1 Background

Crises are becoming more common in society. When the climate changes, higher temperatures lead to more extreme weather conditions resulting in consequences both on society's infrastructure and productivity and increased mortality rates among susceptible members of society, such as infants and the elderly (European Commission, 2022). Severe climate-related crises like flooding, storms, and wildfires that have been seen globally are predicted to become more common in Sweden in the future (Naturskyddsföreningen, 2021).

In a crisis, events are expected to be extraordinary and affect essential societal functions or people's health and freedom. Crises can occur suddenly and often require drastic actions and rapid decision-making (MSB, 2021, a). This uncertainty can affect both individual behaviour and psychological well-being negatively, where it therefore is important that the communication creates a feeling of safety (CDC, 2019). Because of this, it is crucial to include all members of society. Crisis management authorities and other actors are responsible for distributing information equally within society, including people with special needs (MSB, 2020). The project "From passive receiver to active resource in the crisis management system" addresses the importance of reaching all members of society, including those with special needs. The research project collaborates with several universities in Sweden and is financed by The Authority for Social Protection and Preparation (Myndigheten för Samhällsskydd och Beredskap, MSB). This thesis will contribute to the research project by investigating the needs of the elderly.

The elderly living alone with cognitive impairments might belong to the group that risks being more exposed in a situation of crisis. Today's channels for crisis information are largely based on audio and image. It can therefore be difficult for some elderly to comprehend information due to commonly reduced eyesight and hearing with increasing age (PTS, 2019). With decreasing cognition, the need for assistance in daily life also increases (Cohen et al., 2016). Elderly between the ages of 74-79 years often live at home with minor assistance like security alarms, daily supervision, or homecare. With increasing age, it also becomes more common for the elderly to move into care homes as the need for assistance increases. However, this is highly individual, and a large portion of the elderly above 79 still live at home but with assistance (Socialstyrelsen, 2021). In addition, the rate of isolation from society is higher among the elderly as a large portion of this group lives alone (SCB, 2019). According to statistics from SCB (2021), a large proportion of the elderly lives alone in cities and the countryside in Sweden. For example, in the Gothenburg area, a large proportion of those living on islands are elderly. Those living alone with few social contacts are less likely to take preventive actions in a crisis, seeking help or receiving assistance if needed (Aldrich & Meyer, 2015). Therefore, these groups might risk missing out on information.

This master thesis focuses on investigating how information communicated to the elderly in future climate-related crises can be adapted and become more inclusive.

1.2 Aim & objectives

This study aims to investigate how communication in future climate-related crises can be improved using participatory design to become more inclusive and create a feeling of safety for the elderly.

The objective is twofold. The core objective is to guide authorities responsible for informing the elderly about crises. This includes designing guidelines and concept proposals for how future crisis information can be

shaped in terms of content and ways of communication. The proposed solutions should primarily ensure all seniors are reached and improve crisis information for all citizens. The other objective is to explore how to adapt methods for engaging elderly in participatory research when investigating future scenarios and sensitive issues.

1.3 Research questions

To achieve the aim and objectives the following two research questions with supportive sub-questions will be investigated:

- How can crisis information towards the elderly become more inclusive?
    - What channels are used for communicating crisis information to the elderly today?
    - What type of information does the elderly want in a crisis?
    - What channels can be used to communicate crisis information in the future?
    - Are there different needs for adapted crisis information for the elderly living in the countryside and islands compared to cities?
- How can participatory methods be used and adapted to engage the elderly?
    - What methods can be used to investigate future scenarios and sensitive issues?

1.4 Demarcations

Based on the background, a delimitation is made to climate-related crises, including storms, floods, and wildfires. As a result, economic- and personal crises, as well as war, will not be actively investigated. The scope is limited to the elderly above 75 who live at home, mainly in a single household. The research will also investigate differences between elderly living in cities and islands. The focus of this study is on cognitive and social aspects related to information intake, although physical impairments are addressed when designing and implementing participatory methods. Seniors involved in qualitative participatory methods have Swedish as their mother tongue and live in the Gothenburg area.

Based on the demarcations mentioned above, the result of this thesis should be seen more like a compass rather than a complete solution.

1.5 Ethical considerations

A major part of the research in this project was conducted with participatory methods, with both the elderly and other actors from different authorities. It is crucial to consider factors like building trust and respecting personality and privacy when interacting with users in such research. Participants should feel included, and the terms of collaboration should be clarified at the beginning of the collaboration (Banks et al., 2013). It is also important to remain transparent in communicating how participatory data will be used and what role participants have in contributing value to the research. If personal data is collected, consent from participants is needed to ensure respect for their dignity, integrity of personality, and freedom of choice (Leidner, 2021). In this study, consent was asked for orally before recording any participatory activities. No personal data directly traceable to the individual was collected, and answers were anonymously included in the report. After analysis, all individual answers were deleted.

Furthermore, it is essential not to draw assumptions about what the elderly can manage (Leidner, 2021). One common assumption is that the elderly cannot learn new things and are not digital. Ageism is embedded in our society in social interactions, institutions, or cultural practices. It is essential to avoid language terms that

diminish when referring to the elderly and not draw assumptions about the elderly as a homogeneous group to prevent ageism. Instead, the elderly should be encouraged to participate in co-design and be seen as a source of experience and knowledge. It is vital to allow the elderly to maintain their independence, impairments or not, and not degrade people's value based on age (Hausknecht et al., 2022). Therefore, results in this study are reflected upon critically to ensure data is collected ethically and to ensure the usage of respectful language. Whenever users were involved, they could always contribute their thoughts and ideas to the participatory activities, even if the activities were already planned. Before workshops or focus groups, methods were evaluated and tested in advance and adapted to the participants' cognitive abilities and ethics and did not adopt ageism views.

1.6 Sustainability considerations

By investigating how information can become more inclusive in future environmental crises, the study connects to the global goals 13.3 and 10.3 by suggesting future improved ways of communication. Goal 13.3 is about improving awareness and knowledge about the climate crisis to increase resilience to mitigate, reduce impacts and warn in time (Government offices of Sweden, 2013) Goal 10.3 addresses social sustainability by considering ways of mitigating inequalities, which also correlates to the defined scope of this project time (Government offices of Sweden, 2013)

1.7 Process

Since this study investigates needs and behaviors during future scenarios, an exploratory approach was used. A simplification of the developed process in the thesis can be seen in figure 1.1.

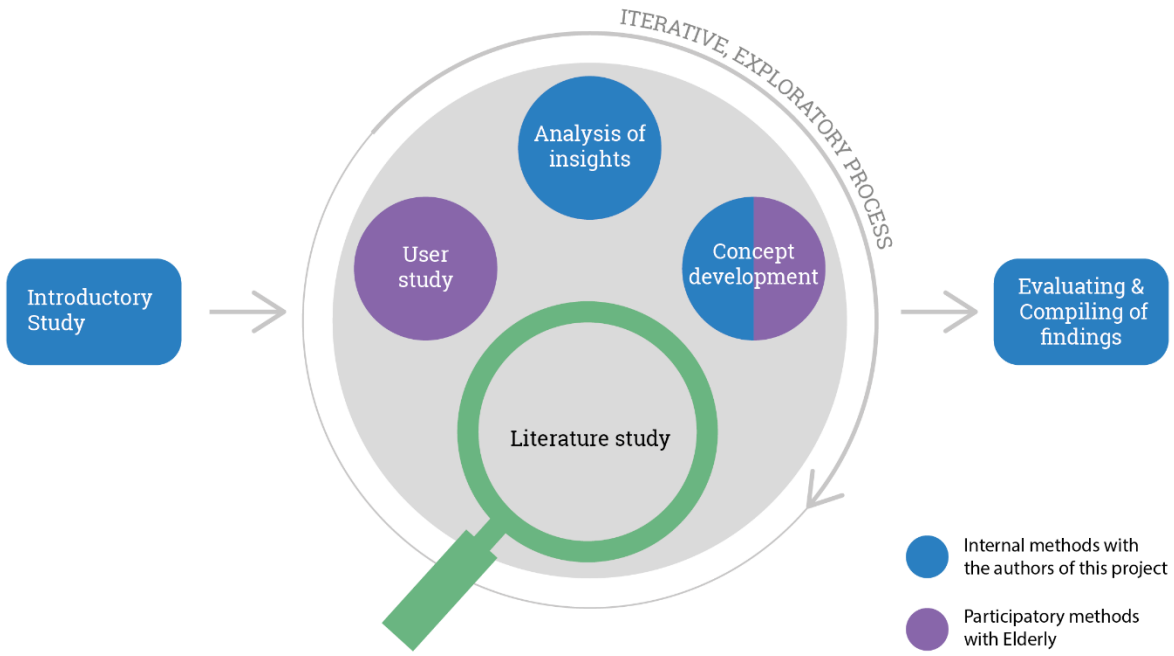

Figure 1.1. Project process consisting of different phases and method categories.

Based on the background, the starting point was the following problem statement:

- Elderly above 75 years living alone with cognitive impairments affecting their information intake might risk being excluded in the communication of crisis information.

With this statement, an introductory study, including an exploratory literature review of communication during past crisis situations and an investigation of how to communicate crisis information in Sweden today, is made. After that, followed the main part of the study being an explorative process consisting of three phases to investigate how to improve crisis communication. The first phase was a user study investigating elderlies' opinions and needs regarding crisis communication today and in the future using participatory methods. Insights from this were analysed and used as support during the concept development phase. Participatory methods were also used during the concept development phase but combined and supported with internal methods. A literature study was conducted to support these phases, covering effects on age-related information intake, and designing for and with elderly, and how to design inclusive solutions and alarm systems. Insights and learnings from each phase were continuously iterated, and the problem statement changed and was further defined. Lastly, the findings from the previous steps were evaluated internally and compiled to answer the research questions and thus fulfil the aim and objectives.

When participatory methods were implemented, the procedure described in figure 1.2 was used. Namely, planning and adopting the following method based on reflections of insights gathered in the previous one.

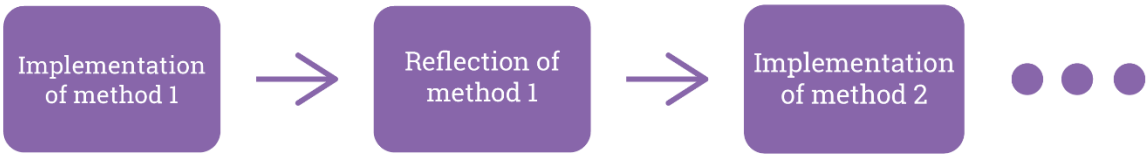

Figure 1.2. Explorative participatory method process.

2 Theoretical Framework

This chapter gives the reader a background understanding of age-related changes that needs to be considered in relation to elderly and information intake. It also covers literature used to support the user study and development phases.

2.1 Age related changes

Cognition can be referred to as the process of how sensory information is conceived through the eyes and ears and processed, recognized, and stored by the brain (Fisk et al., 2014). With growing age, the body and mind change. According to Kutschar (2019), a part of that decreases sensory impairments and musculoskeletal disorders. These will affect cognition and the intake and processing of information.

2.1.1 The cognitive process

The cognitive process is driven by the senses, where a stimulus is captured and perceived by primarily the eyes and ears so that decisions can be made, and information understood. However, the information can be more challenging to interpret if different things are happening or shown simultaneously. It also makes it more challenging to process and store information in the memory. Therefore, the brain uses different modalities like long-term and short-term memory. Furthermore, the human cognitive process uses simplifications like grouping, pattern recognition, and rule of thumb to decrease memory workload (Wickens et al., 2012).

Part of cognition is also concept-driven and data-driven processing, which are strongly connected to audio and visual comprehension when taking in information. Data-driven processing is an automatic, unconscious process mainly dependent on physical stimuli from the surroundings like size, colour, and shape. Concept-driven processing is based on previous knowledge and experiences of situations and human desires and expectations and is connected to long-term memory (Bohgard et al., 2015).

Moreover, diseases that have an impact on the senses, memory, and physical abilities, such as Alzheimer's, are more common with increasing age (Chirayus & Nanthaamornphong, 2020). Therefore, when designing for the elderly, these changes are essential to consider.

Vision

Vision is the dominant human sense and takes in around 80% of all sensory inputs, according to Bohgard et al., (2015). The eyes constantly work on recognizing patterns and processing light through contrast sensibility, night and colour vision, movement detection, and profound vision. With increasing age, the eyesight decreases. Some eye diseases like glaucoma, macular degeneration, and diabetic retinopathy are common reasons for vision impairments among the elderly, according to McGrath et al. (2021). Difficulties in processing visual impressions like contrast, objects, or recognizing spatial localization are some issues that can occur and need to be considered when designing for the elderly.

Light and colour should also be considered to facilitate the intake of visual information. Even with aids like glasses or contact lenses, elderly with reduced eyesight have a more challenging time perceiving visual stimuli. Grayscale, red text on a blue background or green beside a red should be avoided for sensory intake. Black text on a white background or the other way around is preferable and gives a better contrast. The elderly with impaired eyesight needs to rely more on concept-driven processing. This means decoding what they perceive based on previous experiences (Bohgard et al., 2015). Finally, decreasing eyesight can affect cognitive abilities and the psychological well-being of the elderly. For instance, it can be more challenging to participate in social activities or maintain independence in everyday life with reduced eyesight.

Audio

The auditory sense complements the eyesight and is the sense which catches the human attention most effectively (Bohgard et al., 2015) and is thus of great importance when designing a warning system. As we age, our hearing is impaired. One of the most common age-related hearing losses is called presbycusis, also referred

to as age-related hearing impairment (Wang & Puel, 2020). How this decline affects a person's hearing is individual, but common changes are gradual hearing loss, difficulty in determining the source of a sound, and comprehending speech. Therefore, these changes are essential to consider when designing audio information to be used by a broad audience.

Furthermore, for adequate auditory intake for everyone, sounds should stay under 1500 Hz or over 3000 Hz (Bohgard et al., 2015). Complications can occur in the transfer of vocal information from speakers or mobile phones, making the sound even more difficult to perceive for elderly with hearing impairments than in direct communication, especially during high frequencies (Bohgard et al., 2015).

Memory

When it comes to the elderly and memory, Kutschar (2019) emphasizes that cognition-related changes can be highly individual and that some elderly may only experience slight changes. However, cognitive memory-related changes are naturally associated with increasing age and are commonly related to difficulties maintaining attention - likewise, degeneration of long-term and short-term memory. Fisk et al. (2014) describe that there will be varying impacts on cognition depending on the memory type involved**.** For instance, a decline in working memory could change speech, the capability of reasoning, problem-solving, or language comprehension. In addition, diseases like Alzheimer's or Dementia often affect short-term memory and contribute to difficulties in learning new things or lead to personal behaviour changes or perceptual thinking (McGrath et al., 2021).

2.1.2 Physical changes

Increasing age entails a decline in the sense of touch, resulting in difficulties performing simple motor skills such as grasping small objects (Amarya et al., 2018). In addition, there is an increased risk of unintentional movements as the sense of touch is related to balance.

2.2 Designing for elderly

When designing for elderly it is important to consider that divided attention makes it more complicated for elderly to maintain focus. They can easily become distracted by components like sound or multiple colours and patterns. It can also be harder to perform dual tasks and if designing for a screen, colour coding and grouping can facilitate, as long as there are not too many visual inputs to focus upon. For long-term memory it can be easier to understand information in list format as it is easier to process information with a little bit of space in between. In general connecting information to familiar attributes or vocabulary makes information easier to understand regardless of age (Chirayus & Nanthaamornphong, 2020).

Several studies describe how to adapt digital applications for elderly as society is becoming more digital. When designing information channels, knowledge from technologies like eye-tracking, website or mobile function design should therefore be considered (Chirayus & Nanthaamornphong, 2020; Bergstrom et al, 2013).

When designing functions on digital devices, instant feedback or reminders can prove effective in assisting the elderly in understanding functions. Interface layouts can be easier to navigate for the elderly if messages are formulated in simple and polite language. Similarly, spacing between design elements, large-size objects, and fonts is preferable. The navigation can be further improved if combined with specific sound frequencies, giving immediate feedback to actions performed. Also, layouts that do not require precise mouse movements

can improve usability (Wilkinson & Cornish, 2018). Video can be an effective way to share information and make it easier to understand text. Comprehension is facilitated when text, image, and sound are combined so that the observer can follow along (Chirayus & Nanthaamornphong, 2020). Likewise, the font size should be considered. Increasing fonts between a range of 1.78 mm to 3.35 mm for digital screens make the text easier to read regardless of age.

Another aspect to consider is the observer's angle and glare to which the elderly can be more sensitive. Glare can be reduced by using matte screens and no glossy backgrounds on digital devices (Ko et al., 2014). Overall, Bergstrom et al. (2013) conclude that the issues associated with aging need to be considered. Providing usability in different technologies or products elderly use can improve their quality of life.

2.3 Participatory design with elderly

In a study by Duque et al. (2019) examining the purpose and implementation of participatory methods with elderly from 51 articles, interviews and questionnaires are the most common methods, followed by focus groups and workshops. Above all, interviews are stated to be valuable at the beginning of projects to create a relationship between the researcher and the target group. Regardless of the choice of activity and method, it is, according to the study, important to be aware of and adapt it to various disabilities that the participants may have (see chapter 2.1).

Furthermore, it is valuable to involve elderly early in the development process (Duque et al., 2019; Wilkinson & Cornish, 2018). A prerequisite for the collaboration to be value-creating in this case is to develop good communication between stakeholders and participants (Wilkinson & Cornish, 2018). Above all, it is about clarifying that all insights gathered are acknowledged and considered.

Establish a friendly atmosphere

According to Lindsay et al. (2012), a friendly atmosphere allows participants to support and inspire one another and thus contribute to better social interactions. One way to establish this is to ensure that all participants understand that all opinions are welcome. Another is to allow informal socializing. For example, in the studies of Davidson et al. (2013), participants were given time to familiarize themselves before the design sessions, something that proved to be beneficial as it, according to them, *"helped to solidify the 'Design team'"*(p.8).

Small groups and sensitive topics

When discussing issues of a more sensitive character, smaller groups are recommended (Lindsay et al., 2012). Larger groups mean a higher risk of differences in personalities. The result can be unhealthy climates of discussion and thus loss of valuable opinions or thoughts (Lindsay et al., 2012). With a basis on this, Lindsay et al. (2012) concluded that reducing the size of the group to less than nine participants would reduce the risk of this happening and thus establish a more open climate.

Patience and engagement

Small groups or not, discussions can be expected to develop into, for the project, unrelated topics (Lindsay et al., 2012). Therefore, the facilitator needs to be patient and engaged to steer the discussion back to the topic respectfully. Another way of maintaining the focus among the elderly is to keep sessions as short as possible (Davidsson et al., 2013; Lindsay et al., 2012). Short sessions are also critical in activities where participants should go beyond existing technologies and imagine future ones (Lindsay et al., 2012).

Mediating objects to support envisioning

Mediums and objects familiar to elderly participants can help support troubles in imagining future scenarios and technologies. According to Duque et al. (2019), the elderly often lack experience in new technologies, which might result in troubles in creating and envisioning novel solutions as they stick to the familiar. One way of supporting their imagination is to visualize future scenarios and products in a way they are familiar with, using a video (Lindsay et al., 2012). Similarly, low fidelity prototypes can be used, making the future concept easier to grasp and more realistic as it becomes physical.

Flexibility and preparedness

Performing participatory methods with the elderly requires flexibility and preparation for various situations (Lindsay et al., 2012; Massimi et al., 2007). Alternative ways of performing activities and methods should be planned since various needs and conditions can appear among the elderly during the sessions (Massimi et al., 2007). Also, the facilitator should be able to speed down or up the pace if needed and provide an agenda for the activity.

Balance between encouragement and involvement

To gain valuable insights, encouragement of participation and facilitator involvement should be balanced. According to Davidsson et al. (2013), it is essential to know how much you as a facilitator are involved in the meeting. Some participants might be too shy to share their thoughts and ideas, so it is beneficial to ask them directly. Although, if the researcher is too present (e.g., actively brings input), opinions risk being angled according to what the participants think the facilitator wants to hear rather than what they think. A solution to use during design sessions can be, what Davidsson et al. (2013) call, a *"Hands-off"* approach where the facilitator encourages the group to work on their own but are available for questions if they need support to move forward.

Encourage storytelling

Performers of participatory methods with elderly should encourage storytelling of the participants' own experiences. Something that is common and lacking in development projects for the elderly is that they are often permeated by negative age-related stereotypes (Duque et al., 2019), a matter emphasized by Lindsay et al., (2012) as follows:

> "In fact, placing undue emphasis on the functional characteristics that make older people different to younger people can distract designers from considering older people as complex individuals with their own sets of social and emotional needs and desires" (p.1200).

This risk can according to Lindsay et al. (2012) be minimized if giving the participants opportunities to share their own stories.

2.4 Universal design

There are many different names of approaches aiming to design for equal opportunities and accessibility for the largest possible target group (Persson et al., 2015). Among them is *Universal Design*, which in this thesis will support the development of the concept proposal and guidelines to consider as many people's needs as possible.

Universal Design can be defined as a strategy to accommodate the needs of as many people as possible (e.g., different abilities, sizes, and ages) while avoiding the need for adapted or specialized solutions (Null, 2013). The solutions are aimed at people as individuals - to increase the feeling of independence and capability - rather than focusing on disabilities.

Over the years, seven principles of universal design have been developed to be used as a standard for evaluating and measuring existing and new products and environments. The principles are, as quoted by Null (2013, p. 8):

1. **Equitable use**. The design does not disadvantage or stigmatize any group of users
2. **Flexibility in use**. The design accommodates a wide range of individual preferences and abilities
3. **Simple, intuitive use.** Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level
4. **Perceptible information.** The design communicated necessary information effectively to the under, regardless of ambient conditions or the user's sensory ability
5. **Tolerance for error.** The design minimizes hazards and the adverse consequences of accidental or unintended action
6. **Low physical effort.** The design can be used efficiently and comfortably, with minimum of fatigue
7. **Size and space for approach and use.** Appropriate size and space is provided for approach, reach, manipulation, and use, regardless of the user's body size, posture, or mobility.

2.5 Designing warning systems

When designing warning systems, it is often a matter of creating awareness that something is happening, followed by explaining and giving directives on how the affected person should handle the situation (Bohgard et al., 2015). Audible signals are advantageously used to warn or alert about the happening. The sound also helps the user to confirm the situation. For the user to then understand the situation and how to act to handle the situation, the audio signals can be reinforced with light. In circumstances that require more of the affected person(s), it is important that the visual presentation supports both concept-driven and data-driven processing (Bohgard et al., 2015).

3 Crisis communication in Sweden today

In this chapter an overview is given of how crisis information is communicated to Sweden's citizens today in terms of channels used and how mediators of information take seniors into account. The content is based on information from MSB's website, interviews with different actors in Gothenburg to deepen these insights, and email contacts with municipalities in Sweden where there had been a crisis, within the project's delimitations (2018-2021).

3.1 Method

Two semi-structured interviews were performed to investigate how crisis information is communicated in Sweden today and what needs to be considered when encountering elderly is a crisis. The interviews were held with a rescue service manager in Gothenburg and with a communicator in a small municipality in Sweden that experienced a wildfire in 2018. Demographics and interviewee details can be seen in appendix 1, and interview guides in Appendix 2.

For the same purpose, 14 municipalities were contacted through email. Four had experienced wildfire, Five of them storms, and five of them floodings. To be able to identify potential differences in management of crisis communication between different municipalities, municipalities of different sizes and housing distribution were selected based on statistics from the Swedish Agency for Economic and Regional Growth (2021). The questions can be seen in Swedish (as originally emailed) in Appendix 2.

3.2 Communication in a situation of crisis

This chapter summarizes findings on how information is communicated in larger crises in Sweden, concerning both preparatory information and channels used today. Furthermore, it includes additions that have been made for communication information toward elderly.

3.2.1 Preparatory crisis information

In 2018, 4.9 million households in Sweden received the brochure "If Crisis or War Comes" on behalf of the government. The reason was to prepare the Swedish people for various crises, from military conflicts to IT attacks and the consequences of extreme weather (MSB, 2021c). The brochure was sent out in Swedish and is still available (at the time of writing) to download for free on MSB's website (MSB, 2021c). There is also the opportunity to receive the information via braille, sign language, simple and easy to understand Swedish language, and audio reading in English and Swedish. All the latter alternatives require computer familiarity (i.e., handling MP3 files, downloading pdf files) or using services from the Swedish Agency for Accessible Media (MTM).

3.2.2 Information channels and process during crisis

When a more severe crisis occurs, a crisis group gathers belonging to the involved municipalities. Together they assess the state of the crisis (e.g., which citizens are at risk, and how serious it is) and distribute the responsibility for the communication to relevant stakeholders (Josefsson & Sköld, 2021).

An important public announcement (IPA; Swedish: viktigt meddelande till allmänheten, VMA) can be sent out to concerned citizens during a crisis. An IPA is a warning system that alerts people in Swedish society if a threat poses a danger to human life, property, health, or the environment (MSB, 2021b). In severe crises, IPA messages are sent out through radio and TV with intervals of 5-10 minutes to reach the greater majority of people quickly. If there is a very severe crisis, the outdoor signal “Hesa Fredrik” can be used to reinforce the warning (krisinformation.se, n.d). Hesa Fredrik consists of a repetition of 7 seconds of signal followed by 14 seconds of silence. When the crisis is over, an unbroken signal of 30 seconds is used. Similarly, an IPA can be sent out through SMS to people in the endangered area (MSB, 2021b). IPA messages can be sent on a national, regional, and local level, depending on the extent of the crisis).

The procedure for sending out an IPA can be seen in figure 3.1. First, an actor (e.g., the rescue service, municipalities, or government) reports the need for an IPA alert to SOS alarm (1). Then, when the SOS alarm receives a request, they transfer the information to the Swedish Radio transition line and formulate the message together with the requester of the IPA (2). If an SMS is to be sent out, the SOS alarm oversees that. The transition line makes sure the message is transferred through the nationwide radio channels (i.e., FM channels and Swedish Educational Radio) (see step 3, 4 in fig 3.1). The message is automatically saved on a Server at The Swedish Radio with an automatic transition to apps and websites (5). The transition line on Radio Sweden distributes the message to the assisting TV channels (i.e., Swedish Television, TV4, Channel 5 & 9) (6). After the IPA is sent out to the public, more information can be found on emergency number 113 13, municipality websites, or krisinformation.se.

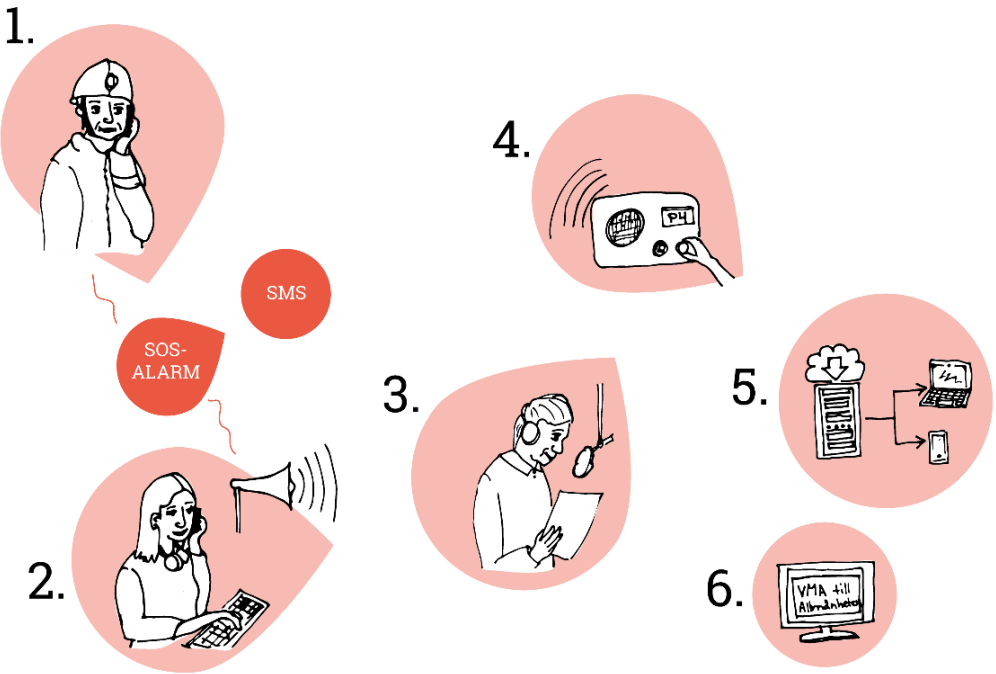

Figure 3.1. IPA Process in Sweden today.

In addition to IPA messages and channels mentioned above, it emerged in the email contact with the municipalities that the communicators at each municipality have a certain amount of freedom to communicate and disseminate crisis information. The channels used are determined based on which members of the society are affected, something strengthened by the interviewed municipality communicator who stated that "a crisis is happening here and now. You never know who will be in the arena and what crises will appear. Therefore, you must use the medium most of the involved people might use (translated quote, personal communication, February 5, 2021)". An example of this, mentioned by one of the emailed municipalities, is that mass communication is prioritized in a situation involving many people. According to most of the responding municipalities, prioritized channels for crisis communication are then their social media (e.g., Facebook, Instagram). One of them also mentioned that if they quickly can identify who is involved, a personal conversation or meeting may be the best way to reach certain user groups.

3.2.1 Adapted crisis information for seniors

When it comes to ensuring that information reaches the elderly, it seems to depend on the situation in question and other citizens' ability to feel sympathy. In a crisis where seniors are identified to be at risk, some of the emailed municipalities and the interviewed communicator stated that there will be a professional (e.g., the head of geriatric care) involved in the crisis management group who has knowledge and responsibility for how seniors should be contacted. In addition, two of the emailed municipalities had developed a telephone line, especially for the elderly during Covid-19 so that they could be reached in a better way. One of them mentioned that they kept the telephone line open during recent flooding in the community. In total, 17 calls were received. Of them, 9 concerned flood issues with 2 wanting to talk about the flood and the rest insurance issues and other matters. The remaining conversations were different, such as anxiety conversations and vaccination issues related to Covid-19. Communicators seem to follow up on major events, but not specifically on how the communication during a crisis was experienced by the citizens.

Furthermore, most of the responding municipalities mentioned that they adapt their websites according to guidelines (e.g., sight, hearing, easy navigation, and easy to read) to be more accessible for people with disabilities. Despite this, not everyone is familiar with digital devices where communication relies on information being disseminated among citizens. At least when it comes to smaller communities (Municipality communicator, personal communication, February 5, 2021).

On-site, during an evacuation, information needs to be adapted to the conditions of the elderly. Clarity, consideration for special needs, and understanding that evacuating activities take longer are important when informing the elderly on-site during a crisis. In addition, they are often more anxious than younger people. Information used in evacuation cases should, therefore, be adapted with specific instructions but not be overwhelming in quantity (Rescue leader, personal communication, March 1, 2021).

4 Exploratory literature review: understanding communication in crisis

This chapter presents the methodology and result of the performed exploratory literature review. The purpose of the review was to understand how information processing, communication, and management occurred during past crises.

4.1 Method

In the exploratory literature review, the data was gathered from supplementing databases and journal sites. Information sources used were Google Scholar, ResearchGate, and Scopus through Chalmers Library. The following quality assessment of the articles was made: the number of citations and status of the journal within the chosen topic area. In addition, news articles (gray literature) were used to map previous crises and portray how people experienced different crises.

The review began with a mapping of previously happened climate-related crises, both in Sweden and abroad, as a more extensive climate-related crisis has not yet happened in Sweden. The purpose was to gain a general understanding of ways to communicate and inform citizens in extreme situations and, in turn, identify where possible improvements could be made. After this, a search for core references regarding crisis communication and behavior during severe climate crises followed. Using the snowball effect, other topics related to behavior and social aspects and how people were affected in crisis were also found. Insights from this review provided a basis for the process of developing concepts (chapter 7). The snowball effect or snowball sampling is a method of research where literature can be found by consulting the reference of a text and thereby find other interesting studies. The same approach can be used to find participants for research and the method is especially effective for addressing societal issues (Noy, 2008).

4.2 Previous climate related crisis

The consequences of extreme weather are predicted to become more common in the future, even in Sweden (SMHI, 2021). Climate crises often result in devastating consequences for society and individuals, especially when weather conditions change and are intensive (Hawkins & Maurer, 2010). A comparison of the consequences of different storms, drought or wildfire, and flooding, that have happened in two decades globally was conducted, which can be seen in figure 4.1 (Gibbens, 2019; Guldåker, 2009; Statens Offentliga Utredningar, 2019; SMHI, 2021; SVT, 2021).

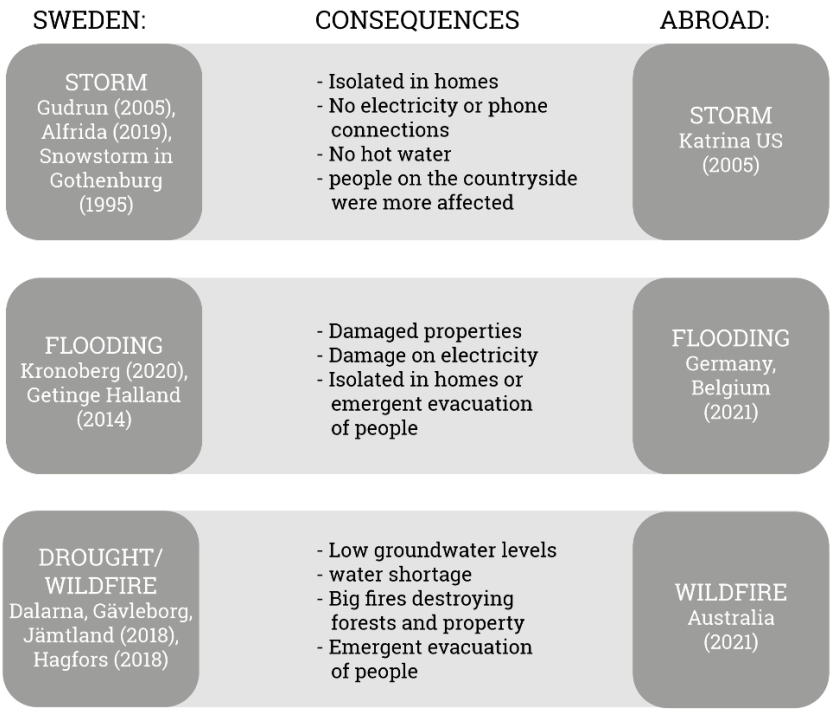

Figure 4.1. Comparison of crises and the consequences in Sweden and abroad.

Similar consequences of the different climate-related crises, mentioned in figure 4.1, were that people were either isolated or needed to evacuate their homes. In relation to this it appeared to be even more difficult for older members of society or those with mobility-impairments to evacuate quickly. There also appeared to be a risk of missing information in general, as power shortages due to considerable damage to property or the surrounding area was a common consequence. Another reason for communication issues in climate-related crises was miscommunication between involved nature experts and authorities. As a result, situations were not taken seriously enough, which led to different perceptions of risks. According to Eriksson (2014), one of the main problems was understanding the expert terms and language, and therefore the communication failed.

In a study of hurricane Katrina in New Orleans in the US, Cole & Fellows (2008) highlighted difficulties in communication and social issues that arose due to poor crisis communication. Information was sent out through local radio channels during the hurricane but did not reach all members of society. The crisis messages from authorities about the severity of the situation were vague, which contributed to confusion among citizens. Also, the understanding of the situational risks varied between people from different ethnicities, locations, and economic backgrounds, which made the information confusing and ambiguous. In addition, the recommendations were contradictory. As a result, people could not evacuate in time, and many lives were lost. A similar situation arose during floods in Germany in 2021, where the preparative information was criticized due to a lack of credibility in information and communication of risks (SVT, 2021). In this case, the consequences were similar, and the elderly were affected to a greater extent.

A previous example of a climate-related crisis in Sweden is the storm Gudrun (2005). The societies in big parts of Sweden were greatly affected as telephone communications and electricity were extinguished during the storm. Many households lived without electricity for up to one week and, in some cases, even longer. Effects were trouble in communication and isolation of people living alone in the countryside. However, smaller communities appeared to be more prepared for electricity loss than cities, as it occurred more in the countryside. Another consequence of the Gudrun was many fallen trees, which complicated work for the police, rescue service, and homecare, and those in need of help or care (Guldåker, 2009; MSB, 2013).

Another climate-related crisis was the wildfires in 2018 in Sweden's northern and middle parts (GT, 2018). During a wildfire in Hagfors, the circumstances were severe, and communication needed to be straightforward and fast to make sure citizens were prepared. During the wildfire, information was sent out with first warnings to citizens through messages on TV and radio. When the situation worsened, those living in exposed areas received direct text messages with directions to stay inside and closing windows and ventilation. In total, 35 households needed to be evacuated. In addition, direct phone calls were used to announce that the inhabitants should prepare for evacuation. Both police, rescue service, and local volunteers helped evacuate the homes (GT, 2018; Jacobsson et al., 2018). The communication flow of the wildfire in Hagfors can be seen in figure 4.2.

Figure 4.2. The communication flow during wildfire in Hagfors.

4.3 Behavioral and social aspects

A Swedish study by Ghersetti and Westlund (2013) investigated previous habits of attaining information and how it impacts what media channels people prefer in a crisis. According to their investigation, today's generation of elderly appears to rely more on analogue media to a greater extent than the younger generations, even though digitalization is becoming more established in society. Earlier established habits of informing oneself through, for instance, Radio and TV channels would probably be the most natural choice for citizens when seeking information about a crisis (Ghersetti and Westerlund, 2013). However, even if some elderly today would prefer familiar communication channels, an increase in social media use can be seen within this group. According to Ghersetti and Westerlund (2013), social media can be a fast way of distributing information through digital means and would reach even the elderly to a large extent.

Digitalization and social media are also discussed by Eriksson (2014), describing benefits like the ability to reach out to multiple channels and target audiences in a short time. Depending on the nature of the crisis, even those who are not so familiar with digital means can be reached. In addition, social media opens new possibilities to create more open communication and trust for authorities. Especially in climate-related crises, a sense of community can be created where information is shared to prepare and open opportunities for social collaboration. In these types of crises, it is equally important to reach out fast with information as the conditions may change rapidly. One example of this is given by Hjorth and Kim (2011) about how Twitter was used during the tsunami in Japan in 2012 to communicate important information from authorities. As a result, a public awareness was created, making citizens more aware of what was happening and feel supported by authorities which increased their trust. However, the drawback of using only one specific social media channel was that the non-digital groups missed information if not incorporated into the community network. Hence, social media can be an effective way to inform a community rapidly but may also need other means of communication.

A good way of including those in society who are not part of community networks is by proactively incorporating social cohesion. Creating opportunities for networking can increase the chance of those with few social contacts or who cannot rescue themselves to receive assistance in emergencies. Therefore, creating opportunities for social interaction at institutional and local levels, like in church or neighbourhood communities, is important. Social gatherings or neighbourhood meetings can improve the sense of security within the group and the trust in society. By enforcing regular meetings or events, individuals in a community can come together and become aware of their neighbours (Aldrich & Meyer, 2015). In addition, it can create opportunities for recruiting volunteers who can have essential roles in crises assisting authorities in rescue or spreading information locally. The benefits of social capital were also proven during Hurricane Katrina, as Hawkins and Maurer (2010) described that those with evolved social networks survived the catastrophe better. Social capital can prove an excellent way to communicate during a crisis to ensure community revitalization and resilience.

5 User study of seniors' needs and opinions

This chapter builds on the knowledge from chapters 2, 3, and 4. It presents the participatory methods used to collect seniors' needs, wants and opinions when receiving information during a crisis. The implemented methods were an unstructured group interview, a web survey, focus groups, an emotion workshop and semi-structured individual telephone interviews. When adapting methods to participatory activities, chapter 2.1 (Age related changes) and 2.3 (Participatory design with elderly) have been used as support. After each method description the results are presented as a summary of insights.

5.1 Method

In total 26 elderly were involved in different ways. Each user's demographics and characteristics can be seen in Appendix 1, table A2. Mediums for reaching the target group were senior organizations in Gothenburg, an elderly consultant in Gothenburg, and informative posters about the project on libraries and meeting places for seniors in the Gothenburg city area. In parallel with this, the snowball effect was also used, where seniors helped to get hold of more seniors.

5.2 Unstructured Group Interview

Unstructured interviews have an open, more informal character. Questions are not guided in advance by the interviewer but where the interviewee can influence the direction according to their interests and opinions (Bohgard et al., 2019). This type of interview is beneficial in exploratory studies, such as this, to specify the project questions as known problem areas were not adequately defined yet. For that reason, this kind of interview was conducted with a group of 5 seniors that attended the painting class every week (see demographics and details in appendix 1) at a meeting place for seniors (i.e., an association-run activity centre for seniors with a café) in one of Gothenburg's city districts.

Topics for the interview were brainstormed beforehand based on the literature review. The starting point was to examine what the seniors think about information in general, how they best understand information and their experiences, and more specific thoughts about crisis information.

Insights

The interviewees mentioned that meeting places are used to talk about everything. Even if they do not have a newspaper themselves or have heard the latest news, others have and will share it. One of the participants mentioned that they receive much information by just socializing (e.g., being active in different senior groups). The interest in getting involved in different activities and the number of meeting places seems to have increased in recent years according to one of them. Elderly can become involved in more ways than before (e.g., various pensioners' associations and aid organizations). However, they need to take the initiative and inform themselves about the activities.

As for which channels they use to seek information, they all considered themselves familiar with news on TV and radio. In addition, all of them listen to at least morning programs at breakfast. Most of them also had a smartphone. However, some of them mentioned that their children and grandchildren sometimes must help with settings. Furthermore, someone had received a notice on their phone; "it is a fire in your area" while others had not received any message, nor did they know how to adjust to get these notices.

After the group interview, the talk with the coordinator and senior highlighted that the digital interest and experiences differ among the members. Some older people do well with digital tools while others have not used a smartphone or computer at all. Many seniors have access to digital tools but are not active users.

5.3 Web Survey

A web survey was made to initially investigate how seniors seek information during a crisis and their experience of receiving crisis information. The survey was used for an explorative purpose; to collect insights that, together with the information gathered from the municipalities and the rescue service leader (see chapter 3), could help set the focus for the project. Some open-ended questions were asked to gain background

knowledge without leading the answers and thus find issues to develop further. Further, Kutchar (2019) describes these types of questions as preferable to use when working with older adults as they are easier to answer than multi-optional questions. However, some initial questions with predefined answers were included to provide insights into the elderly concerning technology. Namely, in questions investigating which channels they use to search for and receive information, general and during crises. Multi-optional answers were also used to investigate different senders' trustworthiness.

The survey was reviewed in terms of language, referring to Hagevi & Viscovis's (2016) book on formulating questions and answers in surveys. To make sure the questions were understandable and would gain purposeful insights, the survey was tested with 3 independent design students and a pilot group of two seniors over 75 (see demographics & details in Appendix 1), after which the questions were revised accordingly with some changes in length, formulation, and language in sentences.

The survey included 18 questions in total (see Appendix 3). Out of these five were background questions, ten general questions about crisis information, and three questions about receiving information in a described wildfire scenario. The wildfire scenario was used to create a mutual reference facilitating the analysis of the answers and connecting the results to the scope of the project. The survey was distributed for approximately one month through senior associations spread in different parts of Sweden. Furthermore, the senior associations shared the survey with their members through web pages, social media, and personal emails. In addition, the survey was posted on personal social media accounts. Different links were sent out to the mentioned distribution channels to be able to measure the response rate.

Answers from all open-ended questions were analysed in a version of a KJ- analysis (Figure 5.1) to estimate what information seniors find most important in a crisis. The KJ-analysis is a method that facilitates building groups of consensus and prioritization of content of data (Haningto & Martin, 2012). In this case the answers to each question were printed and grouped on boards into different categories based on similarities. After that, links between the different categories and questions were analysed.

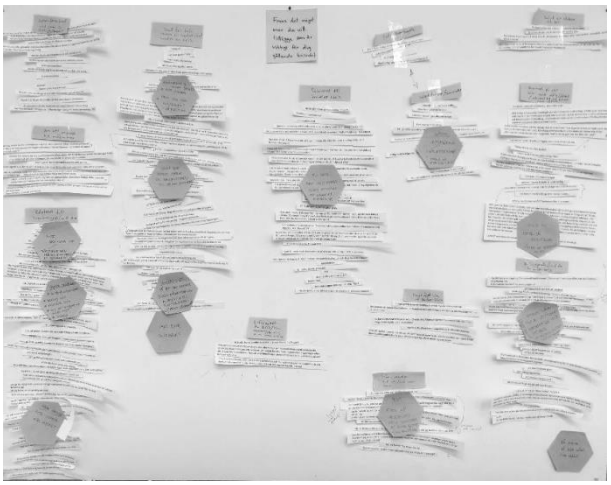

Figure 5.1. One of the boards from the KJ-analysis process.

Insights

In total, 693 seniors responded to the web survey with a median response time of 7.25 minutes. 67% of the respondents lived in a city, 21% in smaller communities, and 11% in the countryside with few to no neighbors. 40% of these live in individual households. A majority of the respondents, around 400, were between 75-79 years (see figure 5.2).

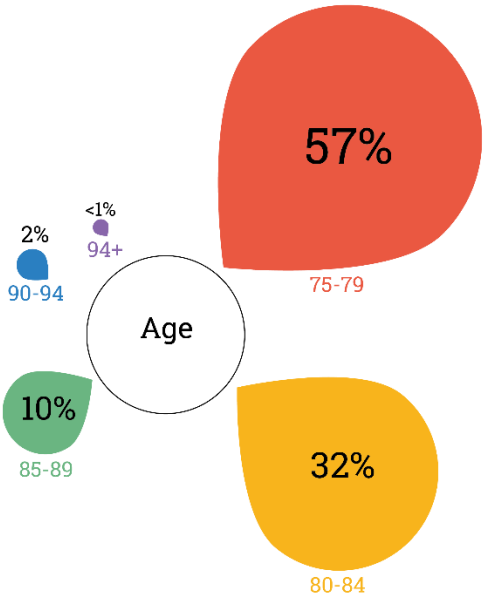

Figure 5.2. Percentage of age among the respondents.

The respondents were distributed across the country, as shown in figure 5.3. The most significant number of respondents were from the region Västenorrland, with a response rate of around 14% (428 of 3006 emailed senior association members in that region).

In addition, 90 seniors in this region answered around 10 pm, indicating that this is a time when seniors are more active and responsive to information. However, this could have been due to notifications upon receiving the email (sent near 10 pm the same night). Nevertheless, this might indicate that the elderly takes direct messages more seriously. Furthermore, distributing the survey through familiar channels in their senior associations might have increased the trustworthiness and the response rate.

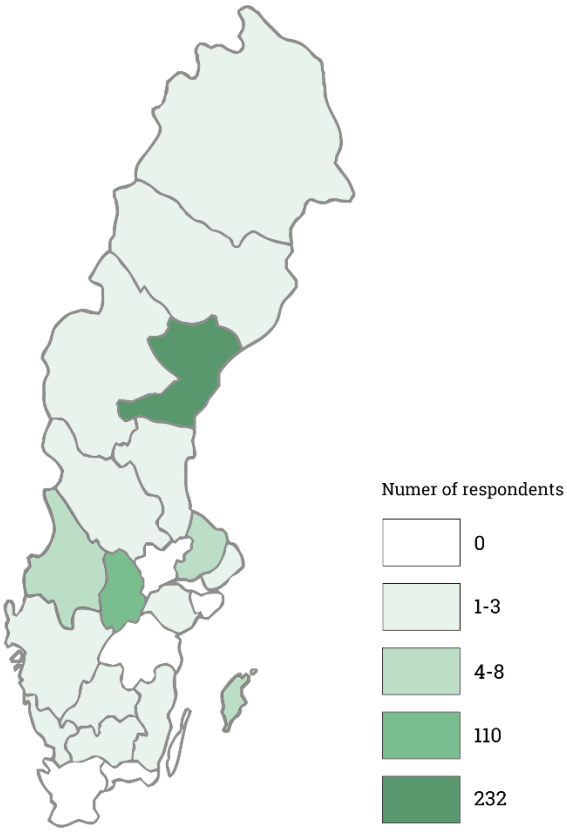

Figure 5.3. Map of Sweden with distribution of respondents marked with colors.

Concerning what sender elderly trust the most in a crisis of wildfire, authorities and the rescue service received over 250 answers each (see figure 5.4).

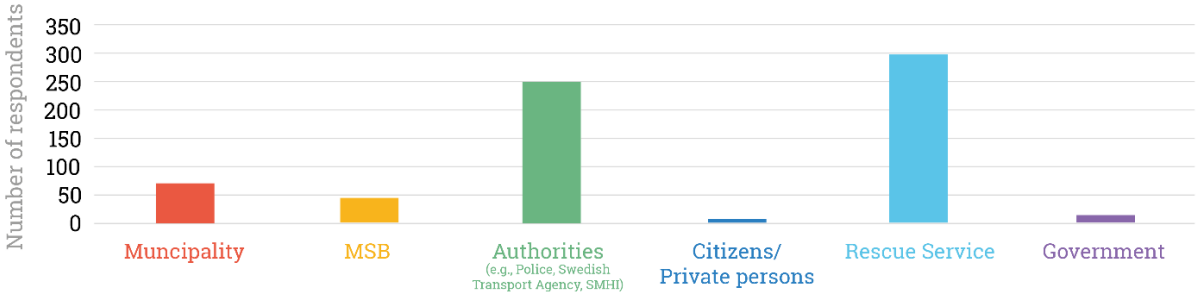

Figure 5.4. Senders of crisis information versus trustworthiness.

Of those who answered the survey, 94 had some aid to facilitate their information intake. For example, 89 % had glasses or some type of hearing aid (see figure 5.5).

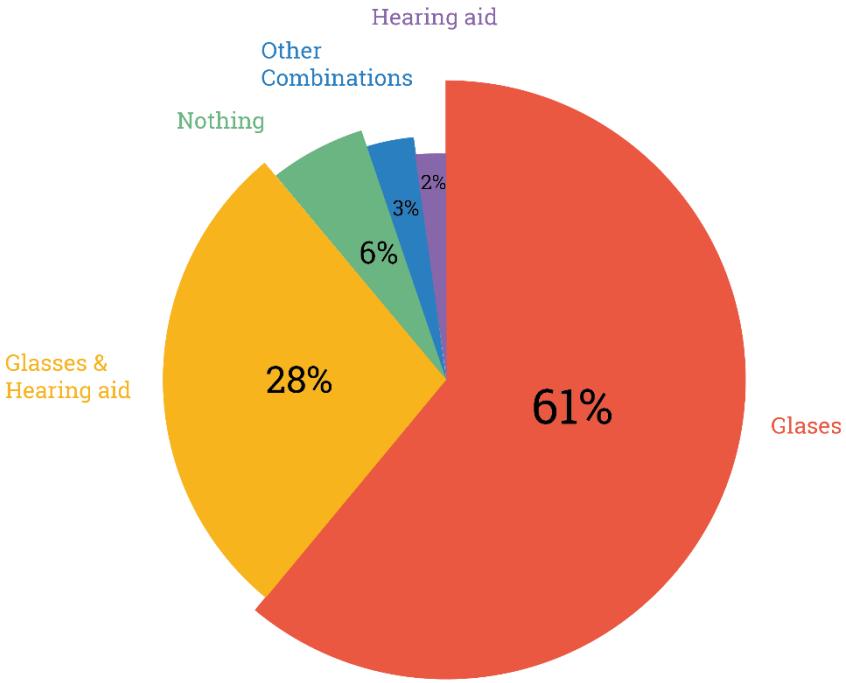

Figure 5.5. Percentage of aids to ease information intake.

The open-ended questions resulted in overlapping answers between the different questions. In some cases, the answers were contradictory. The seniors are well updated on information in general and actively search for information, but first after something has happened. Too much information beforehand can come across as untrustworthy and upsetting. In addition, it can affect how seniors understand crisis information and how seriously they interpret it. Therefore, in a crisis, it is important that the messages sent out are short, informative, from a reliable source like authorities or municipalities, repeated through reliable channels like TV, radio, or text messages, and that events are not enlarged in the media. It can also be imperative for information to be repeated for groups with disabilities like decreased hearing or eyesight, so they have time to take in the message.

When examining the open-ended answers, the question: which information would you want in this situation that would make you feel safe? (tied to a wildfire scenario), received many well-motivated answers. Continuous updates about the crisis and personalized and situation-based instructions on what to do and how to act seemed the most important information to receive to feel safe. Indications of this were mentioned in two representative citations as follows: *"How severe are the conditions and common instructions on what I need to think about"* (translated quote), *"Updates on the situation and possible future scenarios"* (translated quote).

Another important aspect seems to be specific information about what has happened, when and how long it will take to resolve, information about the nearest safe place, and reassurance that authorities or rescue services have the situation under control, increasing the sense of security and safety. In addition to that, knowing that the situation is under control and receiving a prognosis over time may be a reassuring factor. One possible relevant fact on this question was that some who answered appeared to have good relationships with family and friends, making them feel secure and safe. Also, others who were living alone with fewer social connections close to home appeared to feel more worried about the scenario of a crisis close to them.

In figure 5.6, the majority of the respondents answered that they always, sometimes, or often look up information in a crisis and that only a few seldom or never do. Further, there were few differences in looking up information between individual and shared households.

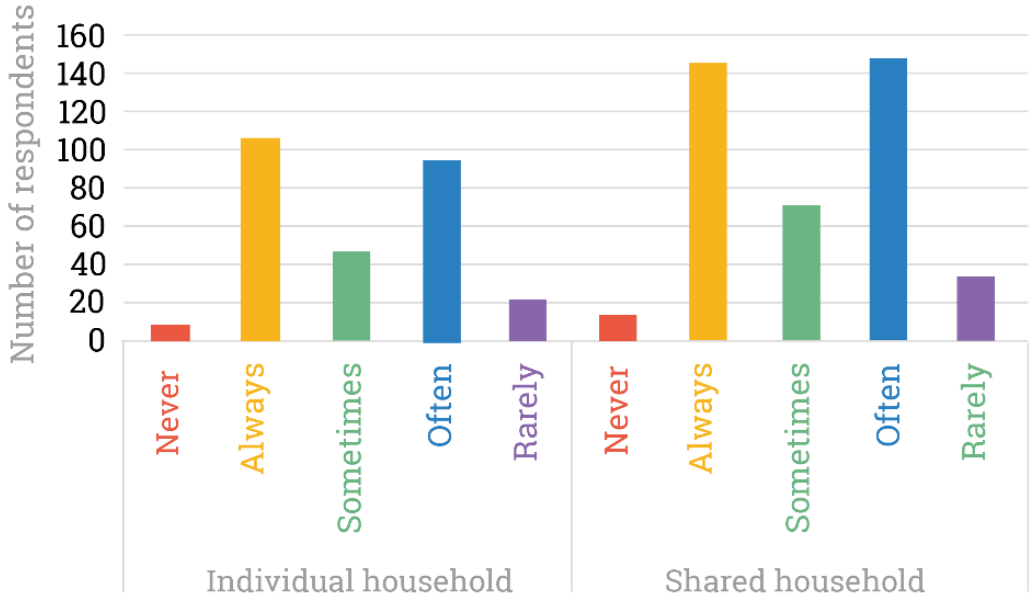

Figure 5.6. Number of respondents in relation to how much they search for information during a crisis.

The open-answer questions that followed this indicated that common channels preferred for looking up information were news on TV, radio, or the internet. This corresponded to the answers about the channels that they used primarily. The open-ended answers suggested that commonly searched information often is related to recommendations on how to act and updates on current situations, responding to what was answered in the question on which information they wanted to receive.

Common more detailed information to search for was:

- Reason behind situation
- Reasons behind power shortage
- Weather updates

- Time prognosis (duration of crisis)
- Fire/water/traffic-related information
- When the issue is resolved

Another aspect of the survey was that a majority answered yes on the question if they were satisfied with the crisis information today. The open-ended answers indicated the same since most of the seniors answered that they want to receive information about what is going on and how they should act, like in the quote: *"Get to know what has happened. If rescue service is on site. Get to know what I as a person should do, for example, stay inside, close windows or evaluate etc."* (translated quote). This might imply that many seniors find today's crisis information sufficient, corresponding to their expectations of what information they want to receive. However, 2,3 % of respondents opposed this, saying that information sent out could become: *"Clearer and more understandable"* (translated quote), *"Faster and simpler language"* (translated quote). This indicates that possible improvements might make crisis information even more precise. Also, when asked if they wanted to add something, there were a few quotes like this one saying: *"If you potentially do not manage to evacuate yourself in a dangerous situation, I would like information on where to turn for help"* (translated quote).

The answers indicated that crisis information today may not be as inclusive as possible. In addition, there were also quotes mentioning that information through personal communication might be necessary in some cases, even though the majority who answered the survey prefer digital communication channels. Also, several answers to the open-ended questions mentioned community collaboration as an essential way of gaining information for some seniors.

Through the survey, aspects that may be important to consider when designing future crisis information or IPA messages were found and are summarized in figure 5.7. When it comes to preparative information, the seniors do not want too much information beforehand, and information should be accurate, not intimidating, and explain possible consequences of the situation. Information during the crisis should be concise with clearly formulated language. Further, messages should include directives on what to do and how to act and give updates on the situation and estimated duration time. When it comes to post-crisis information, knowing that the situation is under control and receiving notes of when it is resolved could increase the feeling of safety.

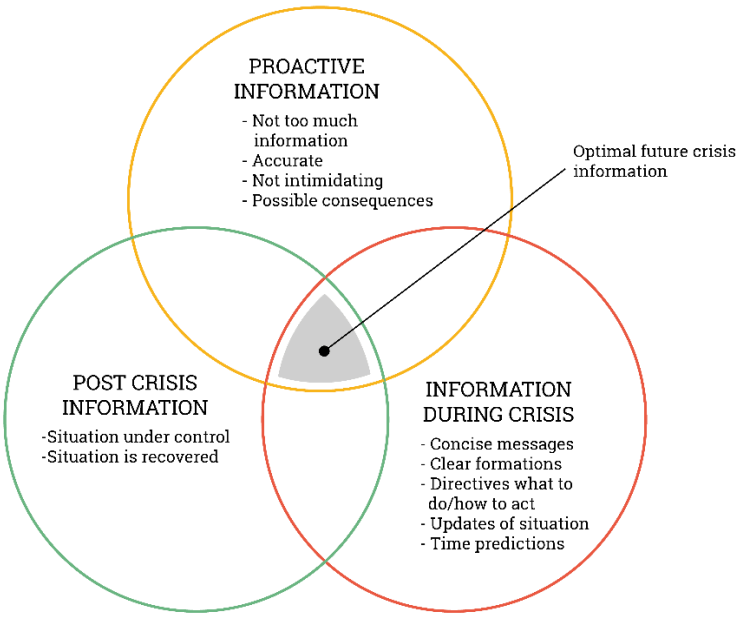

Figure 5.7. Venn diagram showing summery recommended content of future crisis information according to survey answers.

5.4 Focus Groups

A *Focus group* is a qualitative method used for understanding collective ideas and experiences concerning a particular topic or theme through group discussions led by a moderator (Dahlin Ivanoff & Holmgren, 2017). The method can be used for several reasons and in all stages of a project (Haningto & Martin, 2012*;* Dahlin Ivanoff & Holmgren, 2017). In this case, the approach was to investigate the insights that appeared from the open group interview and web survey and generate hypotheses to be further investigated with other qualitative methods. In particular, the focus was to investigate potential differences between seniors living on an island and in a city. Hence, the purpose was to examine seniors' views on how crisis information is conveyed on islands and what they think they need when it comes to information to feel safe in their environment in a crisis.

Two focus groups were held with a total of 9 participating elderly. In both of the focus groups the participants knew each other beforehand. Two groups were considered sufficient as Holmgren & Dahlin-Ivanoff (2017) mention that a decisive factor of an issue is reached when no new knowledge or insights occur, which was the case here. The first focus group consisted of 6 men (median age 78) and the second of 3 women (median age 82). In the women's group, an elderly consultant also participated (see characteristics and demographics in Appendix 1).

According to Dahlin Ivanoff and Holmgren (2017), a certain homogeneity in a group creates an understanding and a sense of belonging, increasing participant engagement. However, at the same time, differences in a group can contribute to more opinions emerging. Participants were chosen with the common features of all being over 75 years and living on an island belonging to Gothenburg. What differed, above all, was whether they were locals or not and how digital they considered themselves to be.

The locations for the discussions were selected based on familiarity and accessibility for the participants to create a causal environment as possible. According to Dahlin Ivanoff and Holmgren (2017), this allows more opinions to arise. For the same reason, the participants in each group already knew each other from social groups and other associations.

To get the participants to share their views on the chosen topic and to enable comparability between the groups, an agenda with points for discussion and support questions was used as support (see Appendix 4). In addition, a flooding scenario was used to simulate the situation and inspire discussion among the participants. Finally, to wrap up, some frequently appeared or noticed differences in the needs of seniors, which emerged from the web survey, were presented to the participants. This is to, according to Dahlin Ivanoff and Holmgren's (2017) studies, highlight variations in views and ideas and thus reach deeper into why the participants think and feel as they do.

After oral consent by all parties, the discussions during the sessions were documented via audio recording and notes. Both verbal and non-verbal statements were noted. The material from each occasion was analysed by listening to each recording twice. The focus the second time was on listening to tones and interactions to better be able to interpret attitudes.

Insights

During the focus groups, similar views and ideas emerged. TV and Radio are expected sources of crisis information. The majority of them listen to Radio or watch television, where they expect to be informed if a crisis happens. One of the participants in focus group 2 mentioned that *"we have set our times when we sit and*

look at the TV news" (translated quote, focus group 2). The rolling strip with a crisis message (IPA) on TV is believed to be helpful, although the women considered the movement to be a bit too fast to read sometimes.

Both the groups seem to believe that almost everyone uses some digital tool. Information on digital platforms is thus believed to be efficient. The participants thought, more specifically, that almost everyone has and can use a mobile phone today. Information that goes via text message or notices will therefore reach many. This was expressed by one of the oldest in focus group 1 as follows: *"There are probably not that many anymore who do not have a functioning mobile phone"* (translated quote). Similarly, one woman in focus group 2 mentioned that *"we are so used to these phones and that information should come there"* (translated quote). During focus group 1, it emerged that some of them use an app from SOS, which warns about all types of events. However, none of the participants in focus group 2 used the app. The participants in focus group 1 underlined that people would manage a crisis well on the islands because they inform each other in other ways (i.e., neighbourhood cooperation). Hence, this app might be less critical to have. Although, it can be more critical in a city that people get info about these apps. After thinking it all through, both groups also mention that not everyone may be able to handle a cell phone completely, which may indicate that some citizens today would risk missing important information if it is only transmitted online.

They do not have an outdoor warning system on any participants' islands. Instead, they seem to rely almost entirely on neighbourly cooperation. *"Not everyone is informed in 5 minutes, but after an hour or so most at least"* (translated quote, focus group 1). It is unclear whether neighbourhood cooperation may exist in the city in the same way. Neighbour cooperation works according to the groups, regardless of whether someone has recently moved in, are a local, or has some disability. The women expressed that in the parts of the islands where new people live, some engage in activities on the island or have a broad social network. Therefore, the group is convinced that in the event of a crisis, they will inform the new habitants. Both focus groups also agreed that someone always knows those who may have decreased hearing or eyesight and would take responsibility for appropriately informing them if necessary. Information is also disseminated through social contexts. Both groups consider social activities such as the church or other group engagement on the islands important in disseminating information. Especially for those who are not as digital.

Even if they believe a lot in their own abilities to manage a crisis and in neighbourly cooperation, they still seem to think that information is essential and update themselves on it. However, some of them are very critical of sources. For example, focus group 1 expressed that the elderly might not trust text messages unless the sender is clearly stated because many scrap messages get there. This suspicion is something that even group 2 addressed. Although, in that case, they stressed a need to become more suspicious than they are. *"We're so naive really. We believe in people. Older people may be naiver than the younger ones, I can say"* (translated quote, focus group 2).

When it comes to the participants' view of preparedness, most of them - in both groups - considered themselves and other islanders to be used to handling storms. According to the men, they would be able to sustain themselves for a week or two, mainly because of the neighbourhood cooperation. Longer than that would be more difficult. They considered themselves to be more prepared and energetic than the inhabitants of the mainland in a crisis: *"The inventiveness out here on the islands is incredibly much better than in the city. We are much better at helping each other"* (translated quote, focus group 1). Similarly, all the seniors thought that the elderly are probably more prepared than younger people. However, they also realized that they might not be used to more extreme situations when, for example, the water rises. Nevertheless, both groups agreed that it is vital to know how long the situation is expected to last to know what to prepare for. Hence, that information should be included in future crisis messages if possible.

There is no sound signal for crises on any islands other than fire alarms. Some of the men in focus group 1 mentioned that they heard the outdoor IPA sound signal (i.e., Hesa Fredrik) from the mainland, but it was very low. Hence, people with hearing impairments would probably miss out on such information. One solution to this, mentioned in focus group 1 was that *"a signal there on the mobile would have worked in 99 percent in any case"* (translated quote).

Lastly, even if the information is appreciated, the groups agreed that one could not worry about everything. Sometimes there can be too much information. Information should come when you need it and be about what you can and cannot do. *"You cannot have braces and belts all the time. How should you be able to live then?"* (translated quote, focus group 2).

5.5 Emotion Workshop

In a workshop, several stakeholders are gathered and engaged in creative activities and intensive discussions to give input on a particular topic (Haningto & Martin, 2012). Workshops can be used for several reasons. In this case, the purpose was to verify the project direction and gain insight into possible emotions and behaviours in a crisis. In addition, it was to investigate how seniors prefer to receive crisis information.

To keep the workshop effective a smaller group of five participants took part in the workshop (see demographics in Appendix 1). The agenda was also kept as short as possible with brief explanations since, according to Lindsay et al. (2012), older participants may otherwise have difficulty maintaining focus. It was held at the same meeting place as the unstructured group interview (see subchapter 4.1) with other participants, already knowing each other, gathered by the café coordinator.

A guide was created to support the workshop consisting of three main parts with associated design methods (see appendix 5). The first part was a warm-up exercise using card sorting to investigate what they associate with a crisis and the need to feel safer. The insights from this were deepened in the second part, exploring possible emotions and reactions in crisis situations using a video scenario to facilitate envisioning and a *circumplex model of affect*. In the last part, the participants were encouraged to envision possible needs other seniors with limitations could have, using a persona as support. Verbal and non-verbal statements were documented, after oral consent, with audio recording, photographs, and written notes. The audio files were transcribed.

5.5.1 Card sorting

Card sorting is a method used to explore how a group of people perceive, describe and group different kinds of information (Haningto & Martin, 2012). It is beneficial for exploring vague terminology, as in this case where a crisis appeared - in the survey and previous methods - to be associated with different things. The participants were asked to select five images out of 55 together based on two different themes and place them on a square. First, they were asked to collect images of what they associate with a crisis. Secondly, what images do they associate with safety in such a crisis? While doing this, they were encouraged to think aloud and motivate their choices.

Insights

The card sorting highlighted both differences and similarities between the participants' beliefs of what a crisis is and what factors that will create feelings of safety. Figure 5.8 displays the final group selection of images.

Figure 5.8. To the left: Images associated to a crisis, to the right: images chosen to express safety.

When it comes to images representing crises, the participants agreed on several kinds of crises, not only war and climate-related ones. All of them thought it was sad to think about war and that climate-related crises could be hard to relate to those happened in Sweden. They selected two images of a fire and an image with a gas mask, which they associated with war. The idea was that everyone might need to wear gas masks if there was a severe crisis. Above all, they were afraid of a nuclear war. Some of them mentioned that they were especially worried about their grandchildren and family during a war where the thoughts revolved around how it would go for them. Contrariwise, one of them was not at all worried.

Moreover, they were worried about being trapped or not being able to get away from an accident or situation, which the picture with the man with one arm over his eyes represents (see to the left in figure 5.8). Family, defence, and communication opportunities were topics that appeared in the conversation when it came to images they associate with safety during a crisis. They chose an image of a light in the dark, which can symbolize some form of hope in the situation (see figure 5.8 to the right). They felt safe if they knew how their loved ones were doing. In general, the participants ignored pictures if they could not understand or see the motive because of too many small details.

5.5.2 Video scenario & Circumplex model of affect

According to Lindsay et al. (2012), elderly users may have difficulties envisioning a future scenario where a video can advantageously be used. Therefore, a scenario of likely severe flooding was portrayed through images, and video effects of rain and subtitles read aloud by the moderator. Hence, different modalities ensured that all participants understood the situation, despite possible hearing and sight impairments.

The video scenario showed aggravated steps (beginning to rain, worsening of the situation, evacuation) and was paused two times. During these moments, the seniors were asked to note their imagined emotions with dots on a circle diagram with pre-defined emotions related to valence and arousal based on *the circumplex model of affect* explained by Posner et al. (2005). To adapt the method to the participants, the emotions were translated to Swedish, the colours red and green were added to explain and reinforce the valence, and a large and readable font was used. As a complement to the diagram, a simpler version of the circumplex was also made, where emotions were written independently on a piece of paper if they did not understand the diagram, which can be seen in Appendix 5.

Insights

At the beginning of the scenario, most people felt a little anxious and stressed or something in the alert or excited direction as each participant's green dot was placed somewhere in this area (see figure 5.9). However, one of them also expressed a certain sadness, above all concerning how others who live worse than he did would be affected. This could indicate that there is empathy for others in these situations, which was also confirmed during the card sorting. Likewise, they may have difficulty imagining that they are affected themselves.

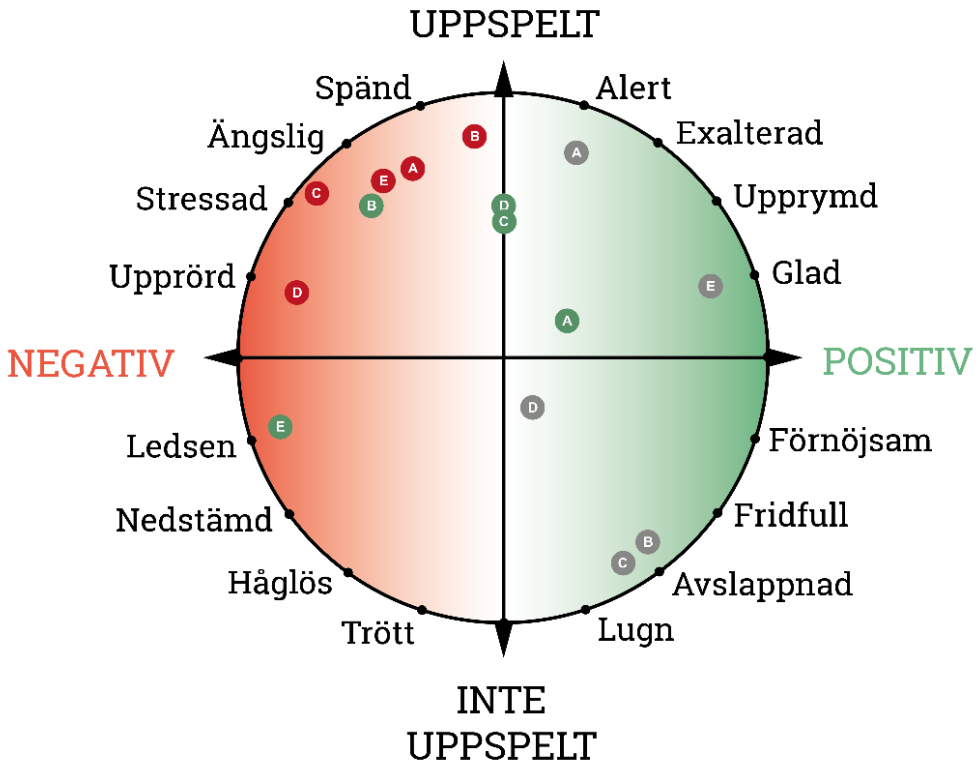

Figure 5.9. Summarized result of circumplex of affection as used in Swedish. Each participant is marked with one letter from A-E. Green dots represent the feelings in the beginning of the crisis, red is when it gets worse and gray when the seniors must evacuate.

When the situation got worse (see red dots in figure 5.9 above), the participants felt that they would feel anxious and more stressed than before when they were told that the water was rising.

Concerning the evacuation stage in the scenario, all participants imagined more positive emotions (see gray dots in figure 5.9). One reason for this, according to some of them, is that they feel calmer as soon as the rescue service evacuates them. Although, some also began to think that it can be scary to be evacuated even if they are happy that help is coming because it can be uncomfortable to get into a boat.

5.5.3 Persona

Personas are fictional representations of likely users regarding behaviour patterns and characteristics (Haningto & Martin, 2012). Several personas are usually made to avoid designing for the extreme group in a project. They are commonly used to test scenarios and aid design communication. In this case, the method was used differently, namely, to get the participants to relate and talk about someone else as they may not

want to inform the group of their own disabilities or know other seniors who may be excluded. Since the purpose of the persona was not to represent the target group, one persona was considered sufficient.

The persona was based upon the literature research on common cognitive limitations for elderly (see chapter 2.1). It consisted of a short description of key attributes and needs together with an image to make it more relatable (see figure 5.10).

ARNE, 95 years old.

- Arne lives on the ground floor in a terraced house in Hisingen.
- He is almost completely blind in the right eye, has glasses and a hearing aid.
- Arne rarely leaves his home on his own because he thinks it's scary due to his limited eyesight.
- He is not comfortable with new technology.
- Arne's daughter therefore usually helps him to read his text messages on the phone because he thinks it's fussy! Especially since all apps are so small and hard to see.
- The most difficult thing for Arne in everyday life, he thinks, is the TV, because there the sound goes up and down so much. He usually has to adjust the volume all the time to be able to hear and it is also difficult to see.

Figure 5.10. Persona, translated from Swedish (as used in the workshop).

Insights

Communication of information generally seemed difficult for seniors with limited sight and hearing. The participants thought that external aids or personal information channels were the only way to reach those groups. At the same time, one of the participants mentioned that a family member does not want any external aids even if she needs them. The topic opened a discussion where they concluded that it might be a question of pride and independence in these cases. In other words, these people do not want to admit to themselves and others that they cannot manage on their own. Thus, this may indicate that there is a need for communication that considers limitations without requiring an external aid.

Another interesting discussion occurred about helping each other out in a crisis and whether or not citizens would talk to their neighbours. The participants believed that people would probably open the door to a stranger in an urgent situation, similar to how people start talking to strangers on trams when technical issues occur. They also mentioned that people probably know if they have a neighbour with disabilities even if they do not talk to them regularly. The participants thought that they, in that case, would help the person in a crisis.

5.6 Telephone Interviews

Five semi-structured interviews through the phone were conducted to gain additional insights and confirm the information from focus groups and the emotion workshop. According to Bohgard et al. (2015), a semi-structured interview is a partially structured interview with a prepared guide with questions. The person interviewing can choose the order of the questions and come up with follow-up questions to match the direction of the participant's answers. The questions asked are generally more open.

The purpose of the interviews was to ask more specific questions about designing future crisis information messages (IPA) and explore how to inform less digital seniors or visually impaired ones. A guide and questions that were asked during these interviews can be seen in Appendix 6. The participants were recruited through the snowball effect method through a member in the MSB research project and her mother. Another member had signed up through a poster in the library and had a friend whom she recommended as a participant. The participants were called up one by one, the interviews were recorded through zoom, and additional notes were taken.

Insights

After five telephone interviews, a saturation point was reached since the answers became similar to what had already been found through the survey and focus groups. Specific demographic information about the participants can be seen in Appendix 1.

Most of the interviewees were aware of their own responsibility to search for crisis information. However, to some extent, they expected society to inform them through accessible communication channels they mentioned they used. In the countryside, one woman mentioned that they did not hear the outdoor warning (Hesa Fredrik). She mentioned that "back in the days" church bells were used for warning in time of a crisis, and she thought that could work well today as churches can be found even in smaller communities. The participants living in both the city and island considered neighbourhood cooperation better in the countryside.

During a situation of crisis, most of the respondents wanted concise information that clearly stated what had happened and what actions were expected of them. They thought that information messages should be formulated in text with short sentences and using language with common words. Some mentioned complicated authority language and paraphrasing as complex, making crisis information more complicated to read and understand.

When talking about information through specific channels, one interviewee thought crisis messages to mobile phones were a good way of receiving information. For messages on the Radio, one mentioned that they should be read slowly and clearly in short sentences and that text messages should have large text. In addition to this,

another interviewee explained that, for example, texts in emails could be hard to read on the phone and that he sometimes, therefore, prints them out. In contradiction, another participant thought it was easy to zoom in the text in SMS if you needed to but reflected that some might not be able to do so.

Regarding information on television, one of them mentioned that the TV messages could sometimes go too fast, referring to the text square for an IPA. The same person thought it was good that the text square was shown repeatedly on the screen but also mentioned that it could be missed anyway. So instead, the interviewee proposed a static list of bullet points with icons and explanatory instructions about what to do to handle a more serious situation. Another one mentioned a similar idea and thought it would be good to interrupt the TV transmission completely.

When talking to the interviewees with reduced eyesight, some visually impaired seem to have devices for reading messages. Even if reading aids are used, they have flaws, such as not recognizing all abbreviations correctly in a sentence. It also appeared to be challenging to go back and listen to one specific part of a message again or the whole message. It is up to the user to know what tool to use and how.

6 Analysis of user study insights

In this chapter, the insights from the user study are analyzed in relation to the theoretical framework. First, the result from the analysis of all the insights from the user study is described. Lastly, the result is triangulated with the theoretical framework and presented in a table.

6.1 Comparison of method results

Through a modified KJ-analysis, insights from each method performed during the user study were written down and grouped according to similarities and contradictions (see figure 6.1). In addition, each method received a different color on a post-it notes to trace back from which part of the user study the insights came from.

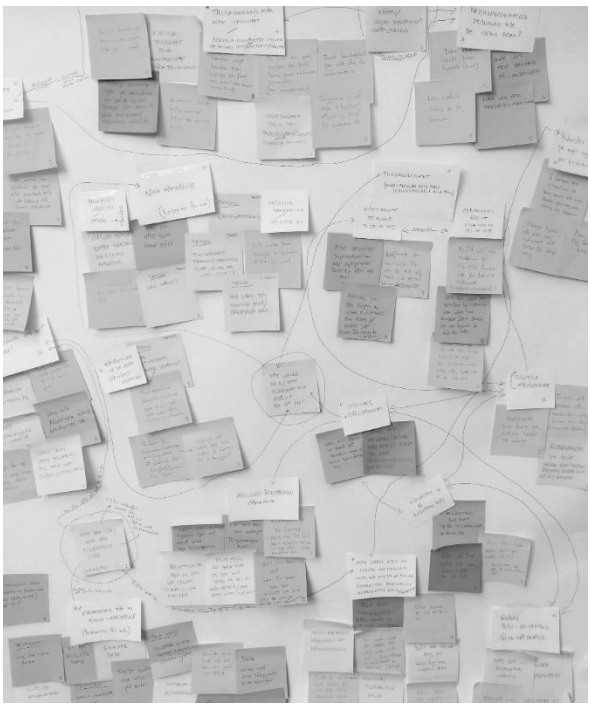

Figure 6.1. Part of modified KJ-analysis.

The insights found could be categorized into four groups. Three groups overlap each other: behaviour, social, and expectational aspects. These three also led to identifying different users who might be in greater need of adapted crisis information. The fourth group, *Crisis message content and clarity,* contains insights to be considered in crisis communication. The four different groups are visualized in figure 6.2.

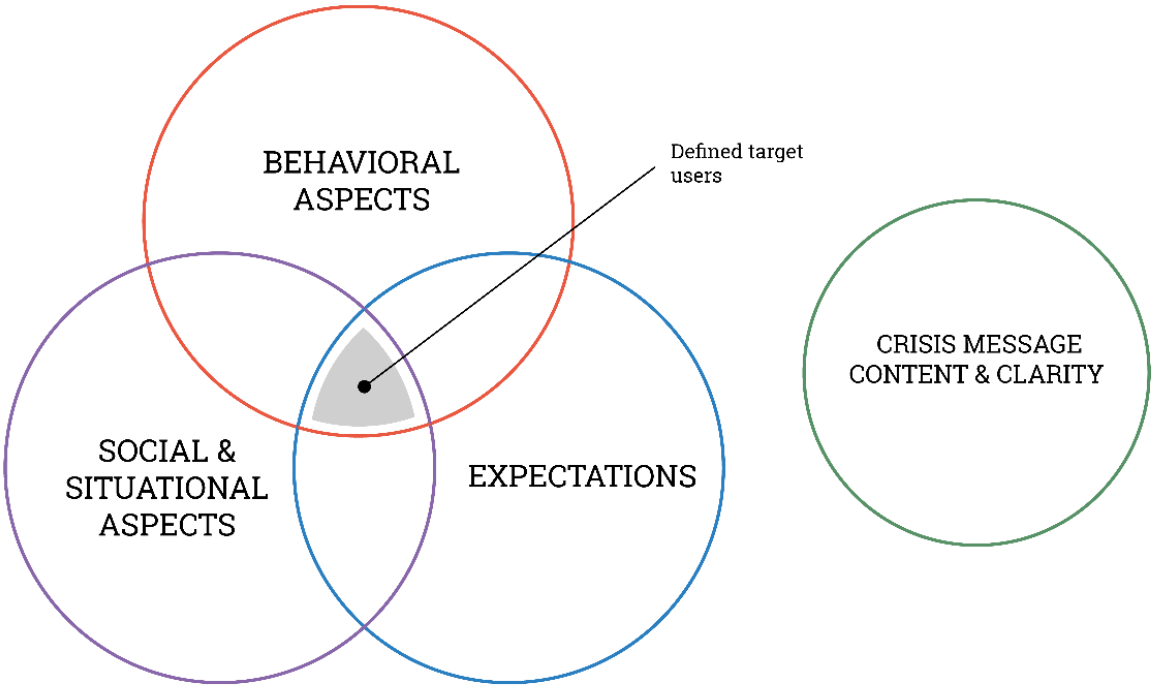

Figure 6.2. Categories of insights resulting from the KJ-analysis.

Behavioral aspects

These insights relate to behavior and cover issues such as how users may potentially act in a crisis or when they receive crisis information. It might also be insights of behavior observed during the user study, identifying unmet needs that the users are unaware of or have not explicitly stated as an issue.

Expectations

The expectational aspects cover what expectations seniors have of societal functions and authorities in a crisis. It also covers expectations that they put on others and themselves.

Social & Situational

The social and situational aspects are related to how opportunities for interaction and collaboration can create a feeling of safety and trust. It also covers how social connections can contribute to sharing information and how to include those living in areas outside of the information system.

Content and clarity of crisis messages

These insights are based on what the participants in the performed methods expressed as important to them regarding content and formulation of crisis messages to be understood easily. In addition, these insights tie back to the exploratory literature review on communication in previous crisis situations.

Defined Target users

During the user study, answers from participants in interviews, focus groups, workshops, and the survey indicated that some existing users could be more exposed to crises, as these were mentioned several times. Because of this, these groups of users might be the critical ones to design for as they are more likely to risk missing information during a crisis (see figure 6.3 on the following page).

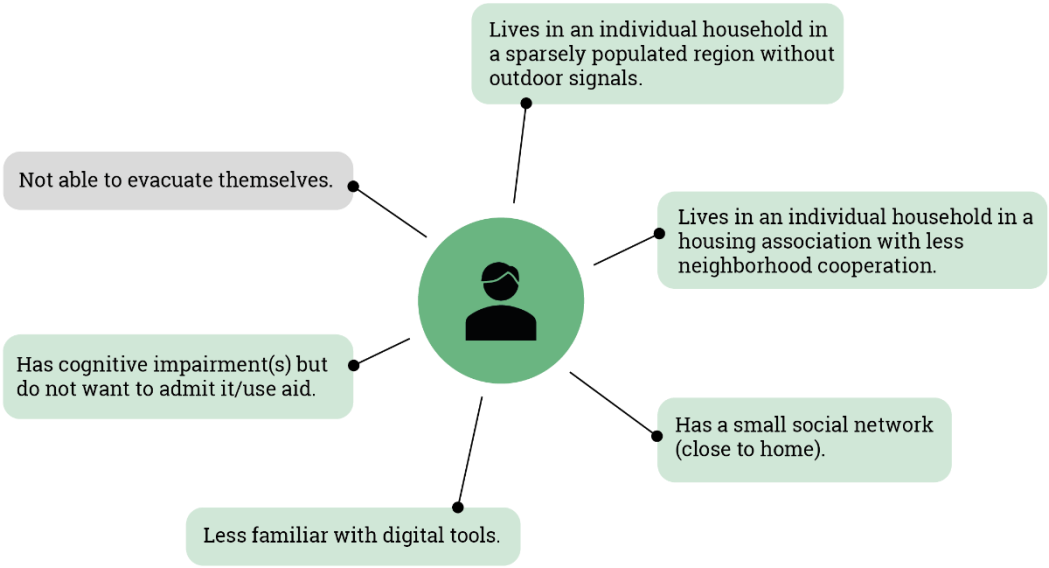

Figure 6.3. Characteristics of defined critical users. They grey user group was identified but not as prominent as other users groups and not prioritized to be taken further due to time resources.

From workshops and focus group 2, those less familiar with digital tools were discussed. It appears more likely that this group would need assistance from family and friends, which was also observed during some of the encounters with the participants. Also, some elderly identified themselves as digital but still described how they needed help with technical devices during the telephone interviews. For instance, built-in functions in phones could be complex for this group, and they appear not to be interested in technology. There are also those with a cognitive or physical impairment who may not want to receive help or admit that they need some aid. During the workshops, some of the participants explained the issues arising when trying to help a relative or friend who does not want help and what the risk during a crisis, in that case, could entail. Not only might these groups miss information, but it could also be more difficult for them to evacuate without assistance.

Another finding from the user study was that outdoor signals are missing in the countryside, resulting in a risk that those with few social contacts might not receive warnings in a more severe crisis. However, neighbourhood operation was higher in the countryside. During the focus groups on islands, the participants described that it was self-evident to help each other out. When comparing this to experiences of those living in the cities or more extensive building complexes, those living alone with few social contacts in cities may be more exposed.

6.2 Resulting insights

Table 6.1 summarizes the insights from the user study in relation to the theoretical framework and introductory study.

Table 6.1. Gathered insights numbered and categorized by aspect category (Insight ID). The aspects are marked as follows: Behavioral (B), Expectations (E), Social & Situational (S) and Content and clarity of crisis messages (C).

Insight ID	Insight	Explanation	Source (chapters)
B1	Many seniors need aids or assistance to fully comprehend information but avoid asking for help or using their aids.	It appears difficult for seniors to admit (to themselves and others) that they need aid or assistance due to pride and privacy, they want to remain independent.	Web Survey, Emotion workshop, Crisis communication in Sweden today, Exploratory literature review
B2	Seniors don't want to worry in vain.	They want information first when a crisis affects them and not too much beforehand.	Web Survey, focus groups, Emotion workshop
B3	Seniors seek understanding of reasons and consequences of crisis situations.	They want to know what has happened and look up further information to feel in control of the situation.	Web survey, Focus groups
B4	Seniors want to know both if the danger applies to themselves and others.	They believe that they would worry about family and friends but also other people in their neighbourhood etc.	Emotion Workshop Web Survey, Behavioural and social aspects to crisis communication
B5	Experience of previous crisis situations seems to increase the likelihood that crisis information will be taken seriously.	Those who have experienced the cold war grew up with knowledge about what consequences a crisis might entail and seem more confident in how to handle similar situations in the future.	Focus groups, Emotion workshop, Behavioural and social aspects to crisis communication
B6	Elderly are aware that society is becoming more digital and they ask themselves what would happen if electricity and the network is closed off.	Participants mentioned the need for preparing oneself and having chargers and batteries at home for backup.	Group Interview, focus Groups
B7	Elderly appears to know about the outdoor signal "Hesa Fredrik". They also know that information about what it means can be looked up in the brochure " If War or Crisis come" from MSB.	Even if they know this, they do not appear to remember what the signal means by heart, and some mentioned that they had not saved the brochure anyway.	Telephone interview, Emotion workshop
E1	Seniors are expected to be digital in today's society (even among seniors).	Many have digital devices and define themselves as digital but still have difficulties in handling them correctly and need to ask relatives or friends for help.	Focus groups, Emotion workshop, Exploratory literature review
E2	Seniors seem to rely on and expect authorities and common channels to rescue and inform them when needed.	They believe they will get information through radio and TV as many of them use these channels a lot. They also strongly believe that rescue service or police will come and save them in a crisis.	Web Survey, Focus Groups
E3	Seniors on islands do not expect much help from authorities in a crisis but rely on neighbourhood cooperation to manage crisis situations together.	It is common for islanders to have social groups and good knowledge of their neighbours. If something happens, they help each other out, and warnings spread fast.	Focus Groups

E4	Seniors want to know what they are expected to do in a situation of crisis.	The seniors seem to feel safer if they receive clear directives on how to act, for instance if they need to stay put and wait for rescue to time or if they should evacuate themselves and how to do it.	Majority of respondents in the Web Survey, Exploratory literature review
S1	Togetherness in the neighbourhood gives a feeling of safety. This might be missing in larger residences/cities.	In larger residences it appears less common to talk to neighbours and seniors do not know who everyone is.	Web survey, Focus groups, Exploratory literature review
S2	Social events appear to be opportunities for sharing information between seniors which is positive for those with cognitive limitations/less digital.	The seniors who go to activities and meeting places for seniors' exchange information there and also help each other out.	Open Group Interview, Focus groups, Exploratory literature review
S3	There are no corresponding outside signals to Hesa Fredrik in the countryside and on the islands.	-	Focus groups, Emotion workshop, Telephone interview
S4	Not everyone notices Hesa Fredrik, despite living in the city.	It can be difficult to hear the signal if you are inside and some participants said that they missed it even outdoors because it is not loud or distinct enough.	Telephone interview, Emotion workshop
C1	Updates and predictions about time and what is happening in a crisis is important for elderly.	They want to know how long a crisis will last and when and if it is under control, they also want detailed information on what is happening.	Web Survey, Focus groups, Emotion Workshop
C2	Elderly wants to know where they can find a safe space and if rescue service and personnel are on site managing the situation.	Receiving information about these things can provide a feeling of safety.	Web Survey, Emotion Workshop
C3	A crisis message is easier to understand if it is written in spoken language with short sentence	-	Web Survey, Focus Groups, Telephone interviews, Exploratory literature review
C4	Elderly wants to know when the crisis is resolved.	-	Web Survey, Emotion workshop
C5	Static text messages are easier to read for elderly.	The rolling text messages on TV are too fast to read.	Telephone interviews, Designing for elderly
C6	It can be good to repeat crisis messages for elderly.	Participants mentioned that it is good that messages are repeated so you can go back or wait for them to occur again if you miss the information the first time.	Telephone interview, The cognitive process
C7	Messages read outload need to be short and read slowly.	In radio it is important that messages are clearly formulated so they can be understood by the listener.	Telephone interview.
C8	Images with large objects and good contrast are easier to see for elderly.	During the card sorting in the Emotion workshop, participants seemed to avoid pictures with too much detail or if they could not recognise what it showed.	Emotion workshop, Theoretical framework

7 Concept Design

Based on the exploratory literature review, the study of crisis communication in Sweden today, and reference literature, this chapter describes how concepts were developed and evaluated with users. In addition, brainstorming, SCAMPER, Storyboarding, and PNI-evaluation were performed internally to support and verify the participatory methods.

7.1 Brainstorming

Brainstorming was performed internally with the authors of this project to process the insights from the user study. *Brainstorming* is a method used to generate many ideas (Ericsson et al., 2015). It is also meant to help create a consensus on what aspects future solutions need to meet and how they can relate to users' needs. There are several kinds of brainstorming, differing in the degree of individual versus group work. Individual work was alternated with group discussion in this project, and ideas were written and sketched down. According to Eriksson et al. (2015), a combination is beneficial for maintaining creativity.

Based on the insights originating from the user study, questions to stimulate idea generation were documented on notes well visible to the project members. Each question involved a new session, where ideas were first generated individually for a set time limit of 5 minutes, followed by a joint review of each idea. The ideas were then developed, and new ones emerged. After completing each session, the outcome was discussed and categorized according to common features.

7.2 SCAMPER

To develop the concepts from the initial brainstorming and to stimulate new concepts, the method SCAMPER, developed by Bob Eberle (Ericsson et al., 2015), was used internally by the authors of this report. SCAMPER is a creative method that asks the following questions about a concept or idea: Can it be:

- **S**ubstituted?
- **C**ombined?
- **A**dapted?
- **M**odified?
- **P**ut to other use?
- **E**liminated?
- **R**eversed?

To cover several different user groups, needs and situations, five concepts (from different themes) - out of several concepts developed - were chosen to be taken further. The five concepts were a drone communicating outdoor signals to the countryside and islands (the drone), a warning through a fire alarm in the home (the fire alarm), a group chat for neighbourhood cooperation (the group chat), an IPA message automatically read out loud (the talking phone IPA) and a crisis alarm easy to place on different items or spaces (the crisis alarm).

7.3 Storyboarding

The five concepts, generated with the SCAMPER method, were visualized through storyboards to primarily be used as mediating tools during participatory methods with the elderly. Storyboarding is a method that can be used to evaluate and specify concept functionality by exploration with the target users in environments and social contexts (Haningto et al., 2012). This is done by building narratives around the concepts, similar to a series, often through simple drawings and supplementing text descriptions. According to Haningto et al. (2012), the visual focus and details in the storyboard depend on the board's purpose and thus who the audience is (e.g., different stakeholders, members of the design team, users). In this case storyboards were considered a good way to envision the concepts in the scenario of a climate-related crisis, creating a relatable narrative. The purpose was also to encourage the seniors to think about how the concepts would solve the needs of different other user groups. Hence, the scenes in the storyboards were visualized to highlight different

target groups' conditions in a crisis, to investigate if the concepts were realistic or not. In addition, images and font size were kept as large as possible to increase readability for seniors with limited eyesight. The result can be seen in Appendix 7.

7.4 Co-design & Evaluation workshop

A workshop was held with four participants over the age of 75, three men and one woman, to understand and validate seniors' thoughts and needs when communicating crisis information and making them feel involved. Two of the men were the same as in the Emotion Workshop and all participants knew each other beforehand. The workshop consisted of three parts; one open discussion of what a clear and believable message is, a co-design part, and an evaluation part using the created storyboards. A guide was made to support each part, as shown in Appendix 8.

According to Sanders & Stappers (2008), co-creation is a design method with users who are not trained in design and working together to come up with ideas. In co-design, the researcher or designer guides their participants through different exercises where the users can become designers. In addition, mediating tools can be used to facilitate the users to encourage their creativity. Therefore, during all parts of the workshop and evaluation, one of the authors of this thesis acted as a facilitator guiding the participants through exercises with additional material. The other acted as the secretary, taking notes during discussions and evaluations and taking photographs of the different concepts that were created.

7.4.1 Discussion of crisis message

At the beginning and first part of the workshop, a crisis message (IPA) was read for the participants. The original message was retrieved from the website krisinformation.se (n.d.) and adjusted to a local crisis scenario. The message was based on the insights from previous user studies, ideas from users, and reference literature on design and cognition for the elderly. The discussion was based on how clear and understandable the message was and whether it appeared trustworthy. At the end of the discussion, the participants also compared the improved message with the original one.

Insights

The message the participants received in the first part of the workshop was clearly formulated according to the participants. They also thought it had good directions on where to go and what to do in the situation. Also they thought it was good with short and only the most essential information in the message. They believed that they would probably receive more information after evacuation to a safe place. However, they were uncertain about the effectiveness of the phone number in the message (to receive more information if needed). They stressed the possible risk that everyone would call the number, not only those who need assistance. Hence, it might be challenging to get hold of help in time for those who need it. The participants also discussed if it was necessary to describe which direction to evacuate and considered that only mentioning a familiar place would be enough. Overall, compared to the original, the message was considered more informative but maybe a bit too long.

7.4.2 Codesign part

The co-design part of the workshop aimed to engage the participants in the design process, enabling them to develop their own ideas and concepts of how they would want information during a crisis in the future. The users were to create two concepts together by choosing cards from different categories with alternative ideas (see figure 7.1). The participants were allowed to choose more than one card from each category.

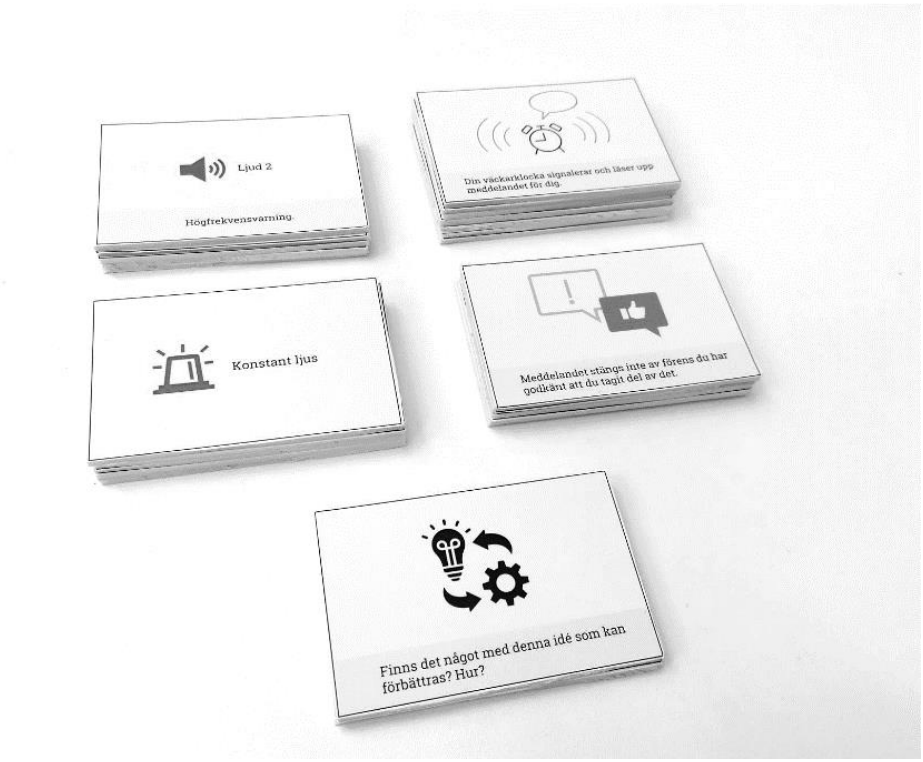

Figure 7.1. Image of the attribute cards used in the co-design session.

The alternatives on the cards were visualized with icons and text and came from previous brainstorming of concepts and the insights from the user study. The cards were put on cardboard to facilitate the participants to hold or pick up the alternatives. Colour coding was used to differentiate which cards belonged to which category. In line with this, post-it notes in similar colours were used accordingly for each category, where the secretary wrote down the participants' thoughts while they were talking. The participants could also come up with their own ideas in addition to the alternatives on the cards. Before conducting the workshop, the cards' content, text, and icons were evaluated by other designers to make sure they were understandable, both in content, language, and visual clarity.

During the workshop, the facilitator started by showing the participants one category with different alternatives, showing them one card at a time. First, the participants got to choose from predefined ways/channels of how they wanted to receive the message. After choosing a channel, the participants could choose ways of increasing attention awareness in a crisis through sound or light, also on different cards. In this part, example sounds of warning signals were demonstrated to observe the participants' reactions to them and inspire the participants to think creatively. The last part of the first session included the participants choosing additional ways to make the message easier to comprehend.

By choosing the different cards, the participants put together a concept with a channel or way of communicating, a way to create awareness, and an attribute to make a message easy to comprehend. After this, the participants got the opportunity to reflect on the concept they had put together and describe why they had selected the alternatives. The concept was photographed by the secretary before the next round, the cards were put back, and the post was collected on a sheet of paper for documentation. Now the participants went through the same procedure again to create a second concept.

After the two concepts were created, they were put up beside each other, and the participants could evaluate them together. The facilitator helped spur the discussion by asking questions about what they liked or disliked about the concepts or what they thought would work or not, as seen in figure 7.2. Meanwhile, the secretary wrote down positive attributes they mentioned on green post-its and negative attributes on pink post-its. Also, other ideas were written on brown notes.

Figure 7.2. Image of participants evaluating their concepts created in the exercise.

Insights

The participants choose combinations of solutions from the cards and made some of their own additions, which resulted in the two concepts in Figures 7.3 and 7.4.

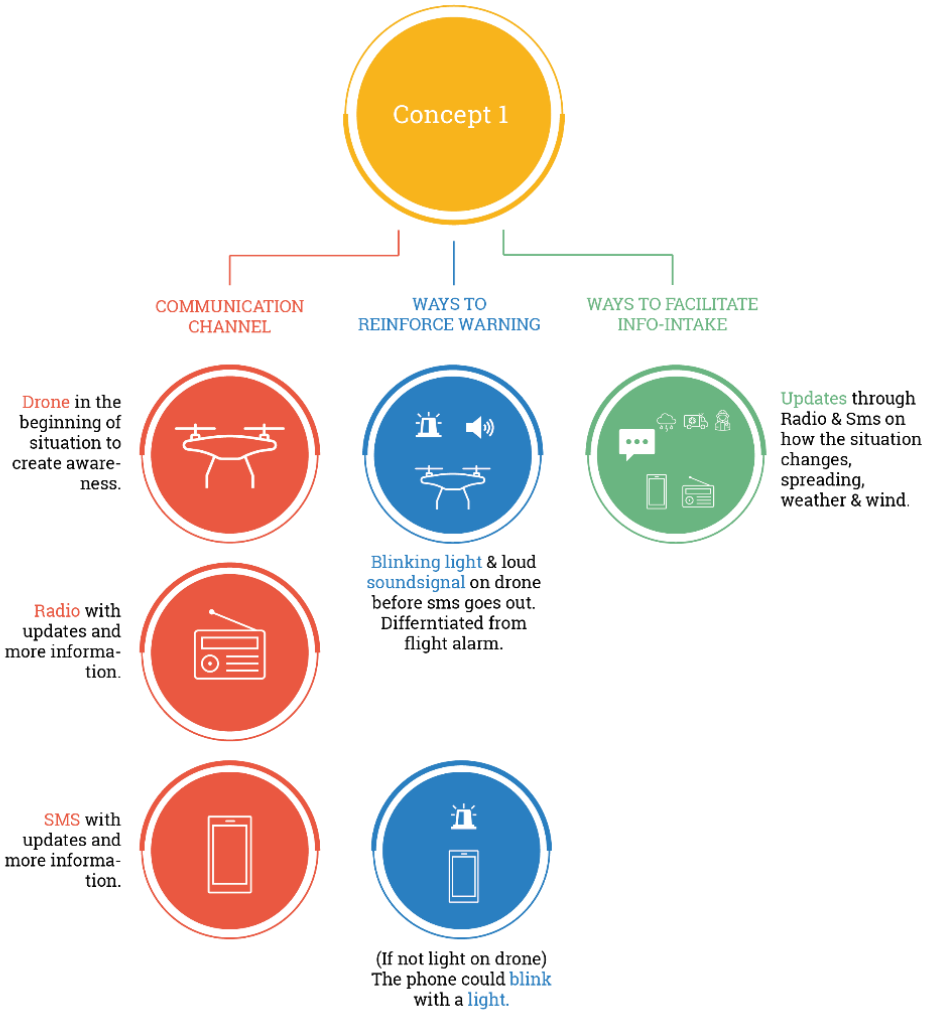

Figure 7.3 Illustration of the seniors' first concept.

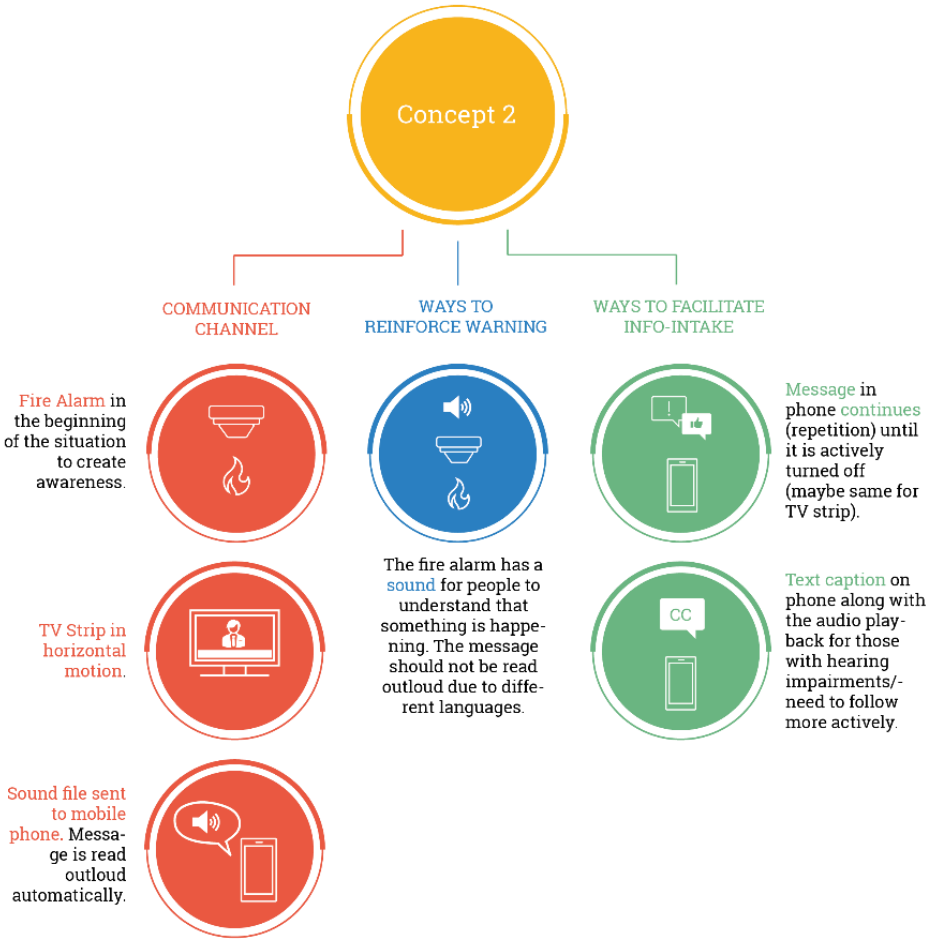

Figure 7.4 Illustration of the seniors' second concept.

The seniors' evaluations of their two concepts are summarized in table 7.1, concluding positive and negative aspects of each concept and comments on interesting thoughts or ideas that occurred during the workshop.

Table 7.1. Compilation of the seniors' evaluation of their own concepts.

	Concept 1	***Concept 2***
Positive	+ Reaches out to many. + No need to press buttons. + Simple and clear information. + The radio is often on.	+ The fire alarm reaches all and is a fast way to increase attention. + Good if the message from the phone starts by itself for those who are not so digital or can see. + Good with additional text to phone messages for those who can't hear. + Tv Good if it starts automatically.
Negative	- The drone might not reach all members in our society in time. - Radio might not work in a crisis if you don't have batteries. - If there is no electricity this might not work.	-You need to be able to do more yourself (understand how to turn off messages) -To hear the fire alarm, you would have to be inside.
Comment	People unable to evacuate themselves might still need help/information from neighbours.	People who are outside will probably get the information anyway as you may talk to your neighbour or others in crisis situations. (You may want an additional number for extra information like 1177).

7.4.3 Evaluation part

The last part of the workshop consisted of evaluating four storyboards described in chapter 7.1.3, displaying different concepts through a scenario. In this exercise, four of the five concepts had been chosen for evaluation as two of the concepts were quite similar. Therefore, it was decided only to evaluate one of them. During this activity, the participants' thoughts were documented on post-it notes by the secretary. Here the participants also had the opportunity of coming up with improvement suggestions or their own ideas.

Insights

The resulting insights from the seniors' evaluation of the storyboards are presented below.

The drone

When it comes to evaluation of the authors' concepts, the drone idea was mentioned to be helpful. However, the flags might not be visible to everyone as the drone would have to go past each window, which was thought to be difficult to implement. Therefore, the participants decided that the flag must be removed. Instead, the drone could have flashing lights. Also, some of the participants questioned whether all citizens still have their brochures from MSB and thus could read instructions about the drone signals if needed. Anyhow, MSB should, according to the seniors, send out a new brochure expressing the importance of neighborly cooperation. The sound of the drone must also be loud and clear, as some people have double pane windows.

The Fire Alarm

The Fire Alarm idea coincided with the seniors' ideas, except for the reading part. Some participants questioned how the reading part would work for those who cannot understand Swedish. Although even if someone might not know the language, they may understand that something is happening. According to the participants, there could exist a unique telephone line for those who do not know the language. Fire Alarm as a warning signal before other information is sent out and would be an effective way of increasing awareness of the crisis.

The Group Chat

The participants were a little hesitant about the Group Chat idea. They had difficulty understanding what a chat forum is and if everyone can manage to chat. One of them mentioned that ”SMS warns, but if you are not so fast, does it work then?" (translated quote). People may want to choose whom they get in touch with and not be forced to talk to everyone in the area. However, they considered it helpful and necessary for some people that neighbors get in touch with each other. Although, they thought that this should happen naturally when neighbors ring each other's doors. Despite some skepticism about opening the door to strangers, many would probably still open the door due to the seriousness of the situation. To ensure that all residents were reached, the participants discussed whether the house's intercom could be used where an alarm could be sent to everyone in the house.

The Talking Phone-IPA

According to the participants, the Talking Phone-IPA idea covered the needs of most users. The text of the voicemail was excellent because some people hear poorly. The idea was also believed to work for those who cannot manage independently.

7.5 Post-its evaluation with seniors

After the Co-design evaluation workshop, minor improvements were made (i.e., the flags were removed from the Drone concept and different modalities were highlighted even more with colours), whereafter all the five

concepts were evaluated with randomly selected participants in a café in Gothenburg. This gave additional perspectives on the concepts and more quantitative data. Furthermore, the café was chosen as it is located beside a meeting place for the elderly where many elderlies from various backgrounds gather. Hence, a wider variety of opinions from the elderly could be collected.

All the storyboards of the concepts were printed and placed on tables in a meeting place for seniors, in central Gothenburg, for one afternoon (see figure 7.5). Post-it notes in different colours were used to collect feedback on the concepts and insights into why the seniors voted as they did. On these notes, expressed thoughts and opinions were documented, foremost by the performers of this thesis. Green and pink notes were used to write the advantages and disadvantages of each concept and brown their vote.

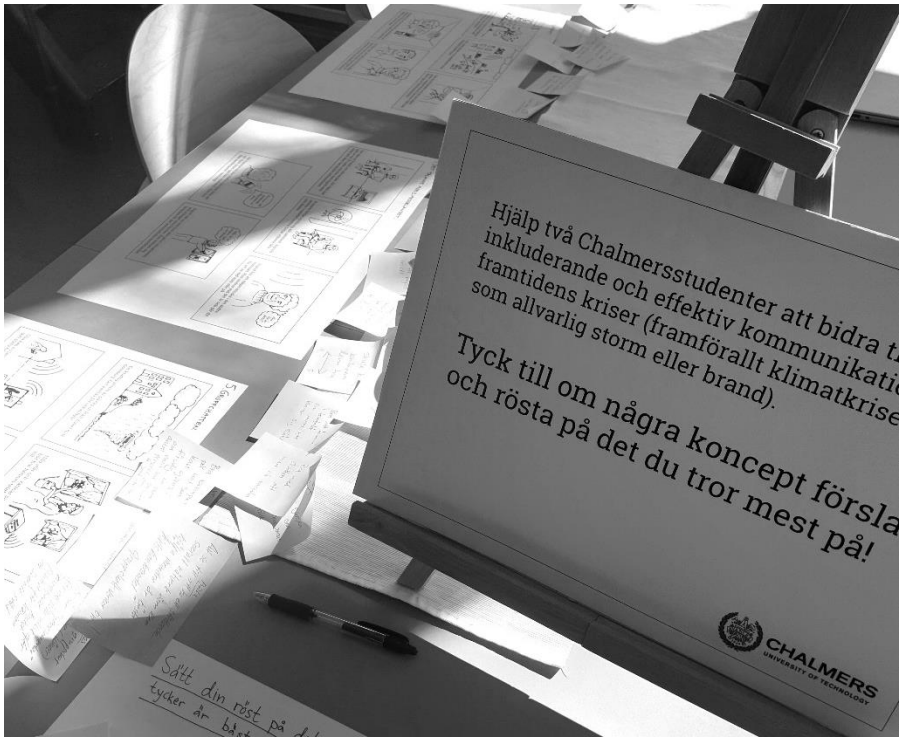

Figure 7.5. Image from the evaluation in the cafe.

Twelve seniors gave feedback that the project group wrote down on post-it notes. "The talking phone IPA" was voted the most realistic concept as it would come through the phone, which is a device most people already have. Also, the participants liked the idea of the automatic message and thought it would be hard to miss with both sound and light signals. The compiled result can be seen in Table 7.2.

Table 7.2. Compilation of the seniors' feedback.

Concept	Positive	Negative	Interesting
The Drone 	+ Useful for people living lonesome more isolated + A reaction to the alarm can be trained in as we have with the ice cream truck today but requires that you are prepared for this to happen (that drones fly out when there is a crisis). + Useful at a larger event if many people are involved, at smaller	- Many drones are required. - You need to know that they exist. - Difficult to hear it with well insulated glass.	i - You can train people's behaviour on the alarm via, among other things, the program *Anslagstavlan* on TV. i - "How should the drone know that I have observed it?"

	ones it may be more efficient to call around.		
The fire Alarm 	+ Easier to distinguish if it is a voice message and not just an audio signal.	- You may not know if it is a fire alarm or something else. - The message may affect the normal function of the fire alarm feels a little insecure. - Someone can eavesdrop on you - Redundant because you have a mobile phone (though good for those who cannot use technology).	
The GROUP CHAT 	+ Helpful to get in touch with others. + Good for those who cannot manage on their own.	- If you have another language, the concept does not work very well - You must have a switched on and charged mobile.	- Good for preventive purposes because you do not have time to sit in a chat in a sharp situation.
The Talking phone-IPA 	+ Good because you already have the phone; do not need any extra product. + The signal is useful since the alarm could be missed when you are more far away from your phone/do something else. + Does not require you to actively wait for a message as TV and Radio but comes directly to you. + Positive with the combo light and sound + Good if you live alone, alone or have impaired sight.	- The phone needs to be kept quite near to you/ you can't be outside. - Can be annoying with too many notices. - You must have a switched on and charged mobile.	i - Can be combined with the Chat Forum.
The Crisis Alarm 	+ Might give a feeling of safety since it is like security alarms. + Can be useful for different crisis situations + If you are a little hearing impaired, you may not hear Hesa Fredrik. + Flashing lights can be useful for those with impaired eyesight. + You react to it like a classic fire alarm.	- Can be used as a complement to existing information channels but is an extra security product to keep track of. - Stressful with an extra thing to keep track of / that gives an alarm. The phone is enough. - Not everyone can afford to buy it. - Not all seniors are that digital and would understand how to install this.	

7.6 Internal PNI

To select which concepts/aspects to keep and further develop, an internal PNI evaluation was performed on the five concepts. PNI is an evaluation method where positive (P), negative (N), and interesting (I) aspects with ideas and concepts usually are listed in a table (Österlin, 2016).

The result of the internal PNI can be seen in Appendix 9. Reflections from this PNI was that The fire alarm would be an effective way to warn people directly in their home. It was also unclear if it would be possible to create some sort of standard for sending warnings through fire alarms. The crisis alarm was a concept very similar to the fire alarm but with more flexibility which was considered a positive aspect. However, both the fire alarm and the crisis alarm would require an additional device to receive IPA warnings. This was considered negative since not everyone has money to buy extra products. Hence, it would not support equality.

When it comes to the talking phone IPA, it was positive that it would work for those with both physical and visual impairments but also for citizens less digital inclined. The only negative aspect with this concept was that it requires a phone that would need to be charged. Lastly, the Drone concept was considered an interesting way to reach the countryside and difficult to train, however some questions as to whether this concept would be able to fly in bad weather conditions remained.

Overall, the PNI brought up similar thoughts to the ones the seniors had expressed during the evaluation exercises in both the cafe and workshop. However, some interesting insights appeared which overweighed the positives and negatives on some concepts. This led to further evaluation and development of each idea to attempt to select the most promising combination of concepts.

7.7 Further development of concepts and guidelines

The insights from the co-design session and evaluation in the cafe were finally compared and iterated with the result from the analysis of the user study insights (chapter 6). Above all, it emerged that none of the concepts is enough to stand on its own. For example, the fire alarm and the drone were valuable for informing in major crises with more people involved. However, they would need some form of explanation and changed behavior about how to react as a recipient for the information to be helpful. Furthermore, the chat group was considered helpful as support and security at the beginning of a crisis. Therefore, it can be assumed that it is vital for this target group to have access to different types of information, both preparatory and actively informative and supportive, as well as the interaction between them. At the same time, older people do not want to be overwhelmed with information from different sources but still be prepared. Therefore, timing when messages arrive is essential when using several communication channels.

Solutions connected to the telephone were received positively and considered sufficient to reach most people, especially those less technically demanding. On the other hand, the elderly are worried about what happens when electricity and telecommunications networks go down in the worst situations. Complements in the form of other solutions such as drones can therefore create more security. Furthermore, direct communication through other signaling systems in the home of the affected individuals was well-received as exposed people do not have to actively search for information and get it more connected to themselves. However, this can also create confusion with other warning systems already in place in the home.

When developing crisis information, privacy, personal space, and personal responsibility also emerged as essential components to consider. Above all, this is about a feeling of surveillance which emerged as a risk with the crisis alarm and the fire alarm. These concepts also place a great deal of responsibility on the individual to

procure and install themselves, which may counteract the inclusion of the elderly who avoid using aids even though they need it. Hence, concepts should require minimal personal responsibility to include these target groups.

With a basis on all these insights, the concepts of *Talking phone-IPA, Drone*, and *The Group Chat* were further developed and supplemented with preparatory information for the final proposal, which is presented in chapter 8.

More general guidelines were also compiled for what to think about before designing crisis messages and communication channels to cover the user groups identified in the project. These can also be seen in chapter 8.

8 Resulting concept proposal and guidelines

This chapter presents the final concept and the guidelines. Together, they provide a basis for how future communication channels can be developed more inclusively towards the identified critical user groups. Initially, the final concept proposal is presented, followed by the guidelines.

8.1 Concept proposal

The resulting concept proposal can be seen in figure 8.1. It combines two IPA channels; Audio SMS and outdoor signal with Drone, one supportive communication channel; a group chat, and preparatory information in a modified "If Crisis or War comes" brochure. The concept is complemented by IPA messages on TV, Radio, and different authorities' social media.

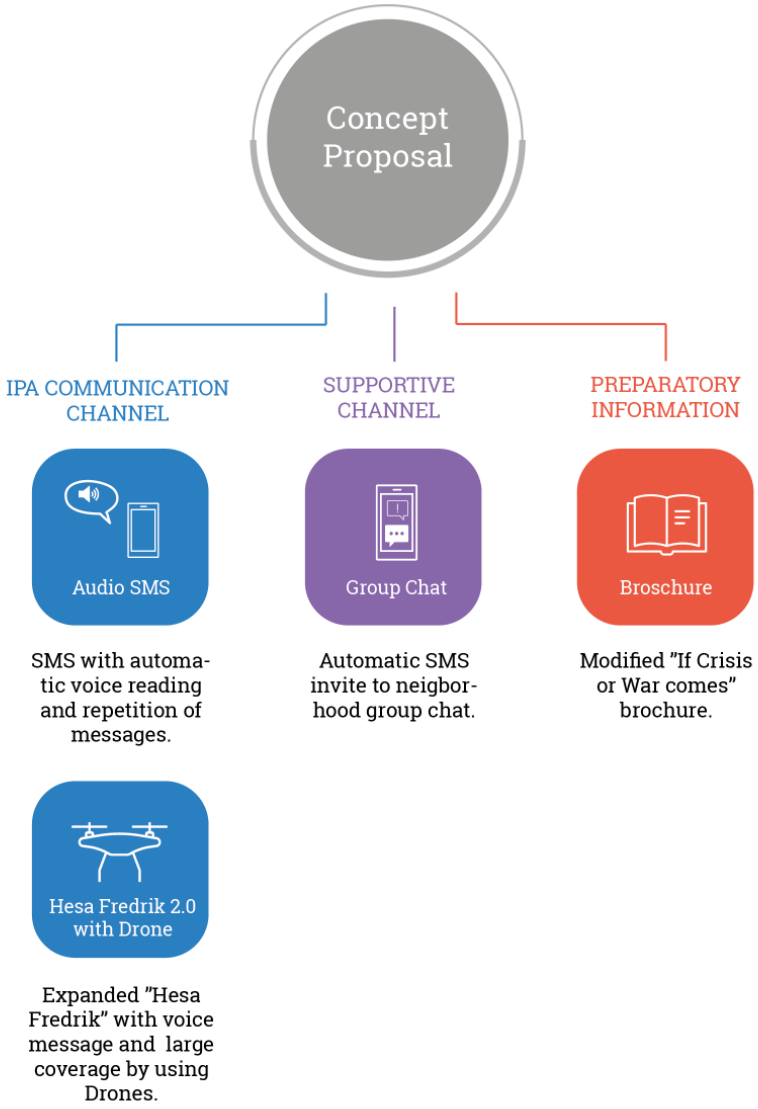

Figure 8.1. Overview of information elements in crisis communication concept.

The relation between the different information channels in terms of the type of message when they are sent out can be seen in figure 8.2. At the beginning of a crisis (i.e., when it is detected and considered at risk of imposing severe penalties), citizens in the potentially affected area are invited by SMS to a group chat with their neighbours. This conversation is open throughout the crisis, allowing them to support and inform each other. In addition, continuous updates during the whole crisis about what happens and instructions on what to do are sent by responsible authorities through Audio SMS, TV, and Radio. Finally, in severe cases - where more drastic measures should be taken to cope with the crisis - the outdoor warning signal “Hesa Fredrik 2.0” will be sent out through outdoor speakers and drones in more inaccessible areas such as the countryside and islands.

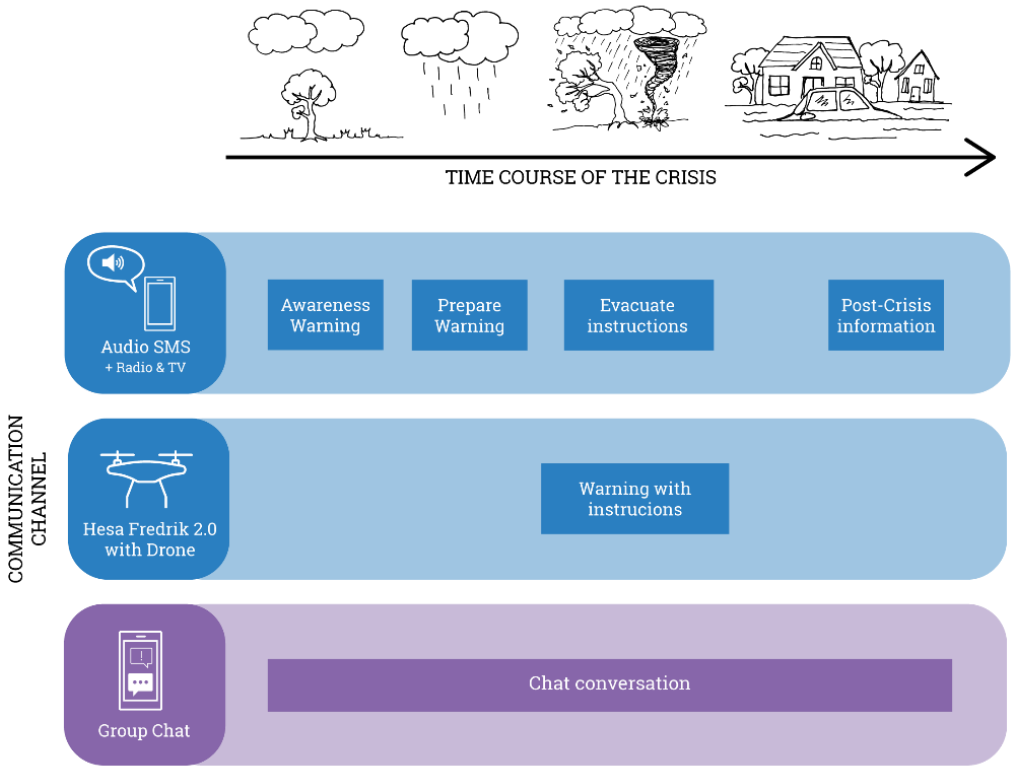

Figure. 8.2. Map of message distribution in different communication channels in relation to the time course of the crisis.

8.1.1 Audio SMS

Audio SMS are text messages combined with automatic voice reading, replacing regular IPA SMS (see figure 8.3).

The messages should be shortly formulated, using large fonts, and are read at a calm pace for recipients with various cognitive impairments to interpret the message. If needed, links to direct web pages and phone numbers where more information about the situation can be found are placed at the end of each message.

Audio SMS should contain the following content elements:

- What has/will likely happen?
- When will the affected peoples' actions be needed?
- How and what shall they do?
- Who is affected?

In severe situations (e.g., preparedness for evacuation), the Audio SMS is automatically repeated until the receiver actively confirms the content in the message. Further, to ensure that recipients with impaired vision and hearing perceive that they have received a message, standardized notification sounds, flashing lights, and vibrations are incorporated into the message.

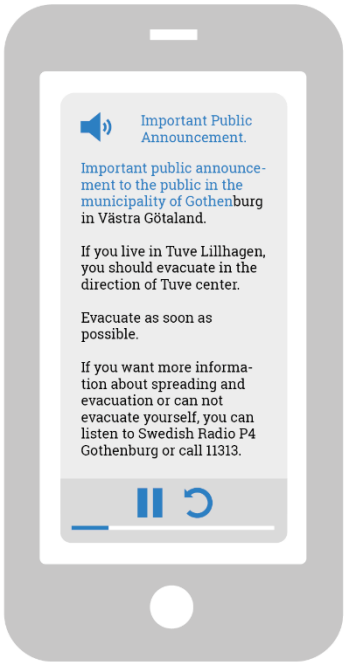

Figure 8.3. Concept sketch of Audio SMS. Read text is marked continuously with colour.

8.1.2 Hesa Fredrik 2.0 with Drone

The outdoor signal Hesa Fredrik should be updated and include, unlike before, a voice message between the beep signals as follows: a signal of 7 seconds followed by a loud voice message (14 seconds). The voice message should describe the situation and what actions those who hear it should take to manage it. This is repeated a couple of times (see figure 8.4), where modifications of the message could be done if the situation worsens. This change aims to clarify what the signal means so that people do not need to look it up if they cannot remember, but also to ensure that more members in society receive information when other channels are knocked out.

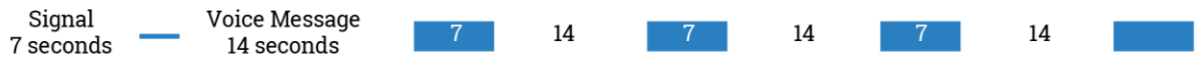

Figure 8.4. Design of Hesa Fredrik 2.0 signal.

To ensure that the signal reaches everyone affected, drones with the signal are hovering around in isolated or larger areas. The drones are marked with a bright color to clarify the source of information and not be confused with anything else.

8.1.3 Group Chat

In the early stage of a potentially severe crisis, after receiving an informative Audio SMS creating awareness about the situation, an SMS about a neighborhood chat group will be sent to residents considered at risk of danger. Before the receiver is automatically added to the chat, he/she must confirm taking part in the rules and understanding it (see example in figure 8.5). Since some elderly might not be used to a group chat or remember the instructions, this information will easily be found again whenever needed.

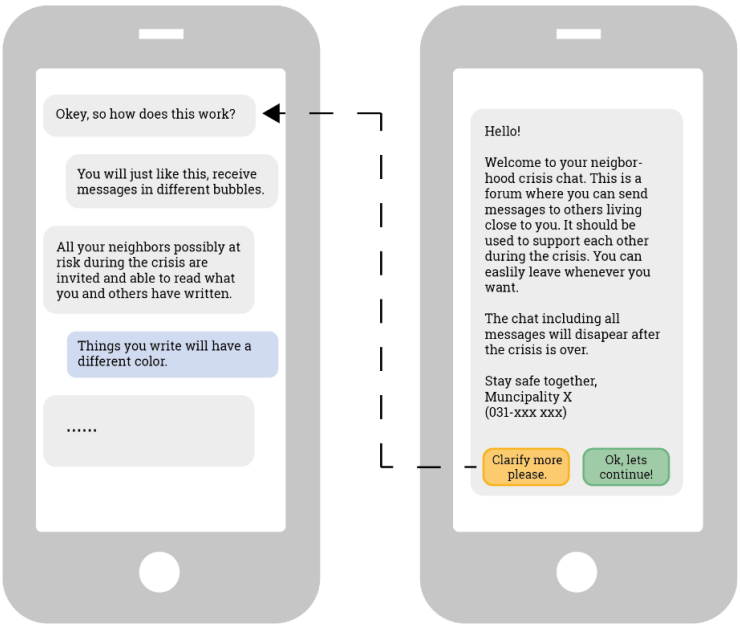

Figure 8.5. Example of message appearance when first received.

Participants can actively exit the chat themselves and easily turn off notifications, but they cannot choose who they want to chat with as all citizens should be included in a situation of crisis. The group chat is automatically deleted shortly after the crisis is over so as not to be misused. If a new crisis arises, the same procedure will be repeated.

8.1.4 Brochure

The brochure "If Crisis or War Comes" (MSB, 2021c) should be updated to prepare society's residents for crisis management. On the page *Emergency preparedness* in MBS's brochure, information about the chat group should be added along with the encouragement of neighbourhood cooperation in general to support the elderly in need of help further. In addition, in the pages describing warning systems, Audio SMS, Hesa Fredrik 2.0 and drones should be described. A suggestion of how all this could look can be seen, marked in blue, on two of the pages in the original folder "If Crisis or War Comes" from MSB (2021c) in figure 8.6 b (see Appendix 10 for complete version of all three pages).

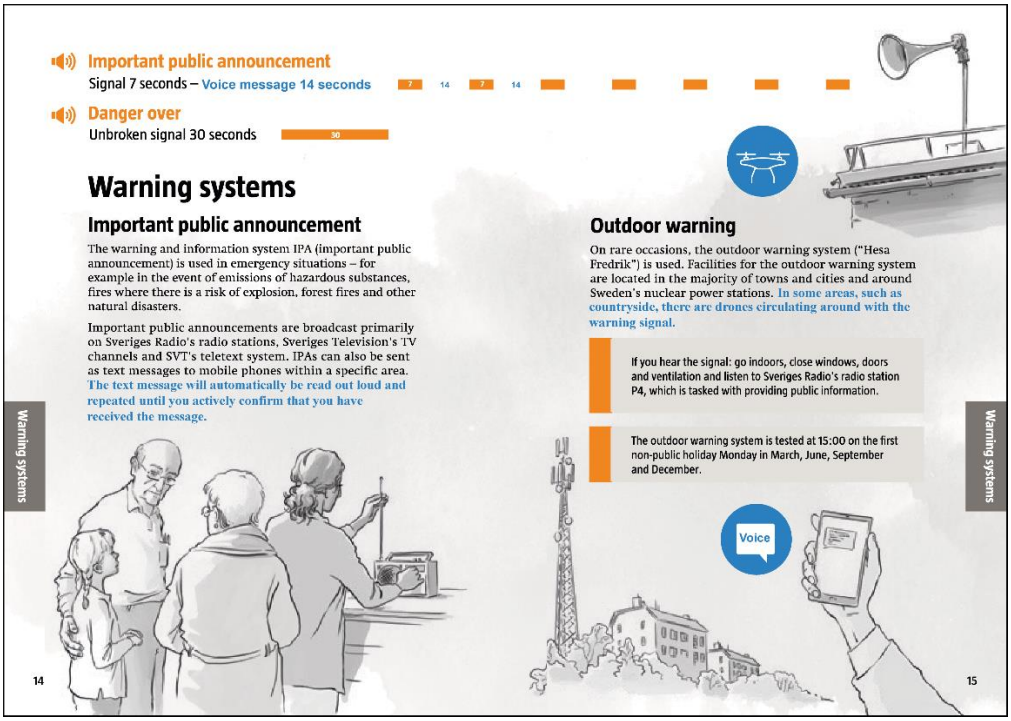

Figure 8.6. Print-screen showing, in blue color, how modifications can be made in the MSB crisis brochure.

To enable more people to read and update themselves, the brochure should be sent out both by post and online via private emails. Furthermore, various authorities should share it on social media on repeated occasions. In connection with this, it is also clarified on the first page where other languages are available and audio reading if necessary.

8.2 Guidelines for crisis messages

The following points are intended to guide authorities or organizations when designing channels and content of crisis information to include the groups of elderly defined in this project. The guidelines are a summary of

the empirical study performed. They are categorized after: *How to inform, channel design, content,* and *design of crisis messages.*

How to inform

These guidelines describe when, how and what medium should be used to communicate crisis information.

- In situations where a crisis can be predicted, a warning to potentially affected people should be issued as soon as possible.
- Instructions of how to handle different crisis situations and what different messages mean should be repeated in preparative crisis information.
- Specific information (e.g., IPA messages) should only be sent to those who are affected by the crisis.
- Crisis information should be kept on local level in the region where the crisis occurs (if possible) to be taken more seriously.
- Opportunities for social interaction/sharing of information between citizens should be encouraged in crisis communication.
- Information through TV, radio and text messages should remain but be combined with other ways of communication.

Channel functions

When designing channels for crisis information, the cognitive process needs to be considered. To include different elderly, it is essential to include modalities considering individual differences in memory, senses, and physical capacities.

- Information channels should be designed and used in a way that does not require digital competence from the receiver to be able to process the information.
- Audio signals must be clearly linked to the situation and differ from other sounds to not be confused with other signals.
- Audio signals should be detectable by all and should remain under 1500hz or over 3000hz.
- Audio signals should be combined with visual information like light or colour.

Content

These guidelines describe what is essential in terms of content in crisis information for the elderly, what kind of information messages should contain, and when what content is needed.

- Avoid general preventive information about what might happen in the future.
- There is a need for increased knowledge about different warning signals about what they mean and how to act.
- Information should describe how the situation is predicted to proceed and how to prepare for the circumstances/ consequences.

- Further information should be available and easy to find when necessary, including links and direct phone numbers in the messages.
- Crisis information should include instructions directed to people affected and clearly state what to do and what not to do, depending on the situation and circumstances.
- In a crisis, continuous status updates should be sent to those affected.
- Crisis information should describe what happened, how it happened and when it is expected to be resolved.
- Crisis messages should contain information about rescue efforts that are made or planned and if rescue service or police are on site to handle the situation.
- The sender of a crisis message should be clearly stated to create trustworthiness.

Design of Message

These guidelines describe how crisis messages should be designed to include elderly. Aspects like cognition in audio, visuals and changes in memory need to be considered as well as language and formulation of the message.

- Written and vocal information should be formulated without difficult wording, abbreviations, or paraphrases.
- Messages should be briefly formulated in short sentences.
- If including images and other visuals in a message it is important that objects are large with clear motives.
- Messages should be designed with high contrast, using dark text on a light background or the other way around.
- Colour coding and grouping of objects should be used when designing messages for digital screens but restricted to few colour combinations. Grayscale or red and green together should be avoided.
- If designing interfaces, familiar toolbars or functions with immediate feedback should be used.
- Glare on digital screens and the angle of the observer should be considered and reduced by not using glossy backgrounds.
- Fonts with high readability should be chosen and font size should be between 1.78 mm and 3.35 mm for text on digital screens.

9 Learnings and reflections of Participatory Methods with elderly

This chapter is a part of the result and presents an overview of the main learnings that emerged and were applied during the implementation of participatory methods with the elderly in this project. First, reflections on each method are presented with suggestions for possible improvements. Lastly, more general insights on what needs to be considered when using participatory methods with the elderly.

9.1 Reflections on each method

Reflections and learnings on each of the used methods and suggestions of possible improvements can be seen in table 9.1.

Table 9.1 Reflections and improvements arisen from the participatory methods.

Method (Chapter ref.)	**Reflections/ observations**	**Learnings**	**Suggestion of improvements**
Unstructured Group Interview (5.1)	a. The participants sat spread out in the room, making it difficult for some of them to hear everything said. This also resulted in several participants talking simultaneously, which made the documentation more difficult. The interviewers, therefore, needed to speak loudly and sometimes repeat the questions several times b. Talking about their own experiences of crises made it easier for them to understand the topics to discuss. However, this made it difficult to stay focused on climate-related crises as they had not experienced as many and thus thought more of war or the pandemic instead.	a. The moderator must be audibly positioned to the participants to include everyone in the conversation. b. Initially, exploring what the participants have from previous experiences related to a complex topic can help them understand their opinions and thoughts.	a. Gather the group around the interviewer and speak loudly. b. A mediating object such as a film of a crisis or images could be helpful to sustain the participants' focus and thoughts on climate crises.
Web Survey (5.2)	a. The pilot group of elderly testing the survey had different opinions about the content and wording used than the younger test persons. b. It was useful to have open-ended questions as they gave a direction to which areas have potential to explore further. c. The questionnaire responses were sometimes difficult to interpret and thus raised several follow-up questions. d. Some of the questions were general. Hence it was not easy to draw more profound parallels or understand the underlying reason for the answers.	a. A combination of test users might be beneficial to cover a less homogeneous target group. b. In the case of many open questions, a physical compilation (i.e., printed quotes compared to each other) helped gain an overview and interpret the answers. c, d. Analysing the answers during focus groups and workshops with the elderly helped gain other perspectives and examine the relevance of ambiguous responses and assumptions.	c, d. Include the elderly even more in the analysing phase.
Focus Groups (5.3)	a. Including quotes from the Web Survey helped the participants think more deeply about and discuss other user groups related to crisis information. b. It was difficult for the participants to keep up with the scenario part. Above all, the participants did not seem to perceive or understand the	b. When exploring future situations not experienced by users, just reading a scenario is not enough for them to imagine possible needs and behaviours. c. Focus groups with city residents as a complement to the focus groups with elderly	b. Some visual representation of the scenario can be useful to increase the understanding/help the participants to imagine the situation.

	worsening of the situation by just listening to the scenario. c. It was helpful to compare two different focus groups with similar backgrounds (islanders in Gothenburg). However, it was not easy to validate whether islanders' assumptions about differences between city and island could be considered accurate.	on islands would probably have increased the validity of the study.	
Emotion Workshop (5.4)	a. The participants had difficulty perceiving the motifs on some of the images during the card sorting. b. The ambiguity opened up to free interpretations and associations, something that created discussions between the participants. c. The more relaxed environment highlighted the participants' different personalities and what was important to each of the participants. d. Having a film and connecting the first scene to the participants' area captured the seniors' attention. In addition, the film itself did not raise many questions and thus helped explain the situation. However, the situation was not considered entirely realistic in their area, where something similar had never happened. e. The participants interrupted the reading of the subtitles on a few occasions as they started to comment on the film's content. Despite this, the reading was useful to let the participants keep up with the course of events. f. Evaluating emotions seemed to be the most challenging task for the participants simply because the exercise was about evaluating an event that had not yet happened. g. The reserve method for the emotions was not needed. Participants understood how to use the emotion chart after the demonstration. However, it was difficult for the participants to perceive differences between some emotions where more explanations were needed.	a. When working with elderly and printed material, make sure the object's size is large enough to perceive. b, c. The method was perceived as a good way to get the elderly familiar with each other's views and topics of a more complex nature. d. The film was a good way to put the participants in thoughts about a particular scenario. However, connecting the situation even more to the familiarity and home area is essential. Events with more similarities to past experiences might be more effective in bringing out feelings and thoughts about behaviours. e. When using film as a medium, subtitles are helpful, but it is important to consider the pace of the scenes in relation. g. The emotion diagram worked well as a medium. Demonstrating how to put dots on the chart was a good way to explain it. h. The persona method was found to help identify the potential needs of other user groups. Although, the framing of the persona might also affect what kinds of needs are discussed.	a1. Testing with elderly before and using larger images with more characteristic motifs would have been beneficial. a2. Another possible clarification could have been to include text descriptions on the images. d. Another situation, such as a forest fire, may have been more valuable as more forest rather than water is found near the area where the participants involved live. e. When using subtitles in films, it may be useful to set aside time for comments and reflection. e. An interesting improvement in this case could have been to simulate a future scenario and thus make the event more real. g. When using emotion diagrams with the elderly, having fewer, more distinct emotions might simplify the process.

	h. The persona helped the participants who knew someone in their vicinity with similar needs (or who, under other conditions, risk missing information) to relate from their perspective. On the other hand, the high focus on needs entailed much focus on function (e.g., a particular sound or light is needed to pay attention) rather than soft values such as a sense of security, independence, or dignity.		
Telephone Interview (5.5)	a. It was difficult to ask slightly more personal questions, especially by phone, as the interviewee's reactions and body language could not be observed.		a. If these were carried out again, perhaps video meetings such as Zoom, or teams could have made it easier to observe the person's reactions and respond to the questions better.
Co-design and Evaluation Workshop (7.4)	a. The participants seemed to appreciate making concepts themselves. b. The participants searched for channels that are familiar to them today on the attribute cards. Further explanation was required for them to think more freely, where the cards supported the discussion. Once they started thinking along those lines, several discussions occurred. There were some of their own additions and ideas, but a lot was based on the cards. c. The division into different categories presented step-by-step seemed to have been advantageous to direct and sustain their focus on the design. d. Hearing different alarm sounds made the participants discuss what kind of reaction it should create in a crisis and thus reflect on how their solution could support and create safety for citizens in an actual situation. e. The evaluation of the internally created storyboards worked well, especially going through one at a time. Some of them needed to read/look at them on their own.	a, b. Attribute cards can help stimulate participants to think about solutions significantly beyond familiar ones. However, one should be careful that the use of the cards can also result in them only choosing the motives that they see instead of thinking of their own solutions. d. Different mediums such as sounds could be beneficial to make the participants more committed to their task. e. It is important to give participants time to look individually at different elements and instructions.	a, b, c. Another follow-up session with an exercise where the participants were allowed to move on freely once they had learned how to design (using the different steps) could have been practical to gain other concepts.
Post-it Evaluation (7.6)	a. Many participants had limited time to spare. The number of concepts and text seemed to have prevented some of them from giving feedback. In addition, this also seemed to have resulted in some misunderstandings of the concepts presented.	a. The number of concepts was too many for the participants to have time to read and understand each one of them and compare them.	a. Instead of storyboards, use some animation of the concepts and reduce the number of concepts. Likewise, the method would probably have been even more

	b. Many participants spontaneously commented their thoughts vocally when reading, where opinions might have been lost due to others talking at the same time.	b. When having limited time, one should be prepared to collect vocal feedback.	productive if it had included physical prototypes. a,b. The method might have generated more responses if the method had been more like an interview where one person at a time had evaluated the concepts. However, it would have required more planning to make it work with the participants' activities.

9.2 General learnings

In this part, more general learnings, i.e., covering several participatory methods with elderly, are listed.

- Flexibility and preparedness were proved to be very important factors in making participatory methods work with the elderly. Above all, it was a matter of taking time to provide additional explanations and allowing for comments to arise during the activities. It was also important to observe and read the group's needs continuously and adapt the exercises accordingly.

- It was also practical to have smaller groups during the group activities. 4 to 5 participants with two moderators were enough to perceive and follow up on emerging opinions and thoughts. For the focus groups, it was easier to establish and moderate an engaging conversation with three people than with six.

- Group meetings seem adequate for experimental purposes because they allow participants to steer the direction and take on topics together. In individual interviews, the interviewer could provide more concrete questions or examples of other people's experiences and opinions to support the interviewee from getting stuck.

- Many elderly seem to find it easy to share their thoughts and opinions vocally. Writing them down, on the other hand, was more difficult. Thus, it is helpful during participatory methods to appoint a dedicated notary.

- Speak loudly and with short sentences as it was difficult for some to hear due to different distances.

- Initiate group methods with an open question/mediating object to stimulate discussion of their own experiences. It seemed difficult to some elderly to imagine a crisis on their own.

- Avoid errors or misunderstandings in participatory activities by testing methods with pilot users before implementing them.

10 Final Discussion

The following chapter contains the final discussion of the project. The discussion is divided in five parts: *Addressing complex issues, Participatory methods and process of research, Concepts and guidelines as final delivery, Transferability to other user groups*, and ending with *Fulfilment of sustainability goals*.

This project has shown a need to reach out to the elderly to create security and trust in the communication sent out in emergencies. This confirms the hypothesis described in the background of this project being that elderly may belong to one of the groups that, to a greater extent, risk missing information in a crisis. However, as the elderly are not a homogenous group, it has been challenging to develop a single complete solution or guide to ensure that all elderly are included in future crisis information as they often have several overlapping needs. Instead, this project proposes conceptual alternative ways and channels of communication to face different needs among potentially more exposed elderly.

10.1 Addressing complex issues

By working closely with the elderly, the more "extreme user groups" designed in the early stages of this project could be confirmed by existence and closer defined. Even if the research group did not directly work with these users in the participatory activities, the result pointed toward a greater need to include those living alone, with few social connections, with cognitive impairments, living in the countryside or cities, and those who are not so digital. This insight is a bit harder to address as these groups sometimes do not want to admit their need for aid or assistance in general. Therefore, dignity and privacy might need to be considered and further investigated when working with or designing information for these user groups. Not only because they have been challenging to reach in this project but also since talking about shortcomings is a sensitive issue.

Another aspect that may have affected the outcome is that future climate-related crisis scenarios are difficult to understand for users, mainly because the conditions of these crises can occur suddenly. In this project, it was thus harder than anticipated to research and relate to the crises for participants, as no more significant catastrophic event has happened in Sweden yet. However, one local memory of a natural crisis that some participants had was the snowstorm in Gothenburg in 1995, which helped them relate more to the topic. Still, it appeared difficult to imagine situations like flooding or wildfires to happen and become severe enough to affect oneself. Even in participatory activities with mediating tools, the urgency of a crisis scenario was hard to convey. It would have been interesting to investigate if results would have turned out differently if other creative participatory methods, like enactment (Strömberg et al., 2020), had been used. However, the project group decided that realistic re-creations of a crisis could have been intimidating and not in line with ethical considerations, especially since the user study indicated that the elderly did not want to worry in vain or receive too much information beforehand.

Concerning crises being a complex topic to address, the war situation in Ukraine in 2022 made it impossible to keep participants from relating to this when thinking of a crisis. The war broke out halfway through this research and naturally became a more relatable situation than a future climate crisis. Therefore, the results and insights from this user study need to be considered with critical eyes. However, it can be assumed that needs and requirements in climate catastrophes and war would be similar, as both events occur suddenly. Therefore, further research on differences and comparisons on this would be interesting.

10.2 Participatory methods and process of research

During the participatory research, methods were adapted and reflected upon iteratively. This way of working proved advantageous in finding interesting topics and issues to investigate further. It also facilitated the comparison of insights with theoretical references and results from participatory activities, which would have been much more difficult in a linear process. This also led to unexpected findings, like the insight that the

elderly in cities with few social contacts probably would be more exposed in a crisis. In addition, it also appears that the elderly on islands seem to have a well-established neighbourly collaboration of sharing information and helping each other out in general. Therefore, it could be interesting to investigate the social networks of smaller communities. Maybe that could inspire future communication channels, but also for handling other critical situations.

When it comes to the generation of concepts, co-creation proved to be a valuable way to spark the participants' imagination, even if exploring the future is a complicated issue. For example, during the concept development with pre-defined functions for future communication channels, co-creation facilitated for the participants to add their own ideas to the concepts they put together. It also contributed to new ideas to consider in the further development and continuation of the project, which would not have been gained otherwise. Also, using the video to stage flooding started a good discussion even if they felt that the situation was unrealistic. Hence, using scenarios and engaging participants may help realize unmet needs or encourage creativity in complex future issues, even if they are still hard to relate to. Without the scenario in the video, it would probably have been even more abstract to imagine what information you would want.

Another insight from the user study is that those who have experienced a crisis may be better prepared in the future. This discussion occurred several times as the elderly mentioned that they believed they were better prepared for a crisis than younger generations, mainly because they had experienced the cold war and non-digital times. Although this might very well be true, the issues of crisis communication today may not be the same in the future. Therefore, it could also be interesting to explore how younger generations view crisis information compared to the elderly.

When addressing the conducted user research, it may be questioned why a web survey was used and seen as relevant in the initial face of the project since many elderlies today are not that digital. However, at the beginning of the project, it was considered valuable to gain background and a general understanding of what is important to the elderly in relation to climate-related issues. The survey was considered valuable as other users' needs apart from those answering the survey occurred. Insights about the need for social networks and improved communication for those less digital or with impairments were discovered and could be further investigated. Hence, without the survey it would have been difficult to uncover topics and issues which led to the results in the end of this project.

Some final reflections to consider in the user research are that the participants from different meeting places involved in the project were generally very active and social. Hence, they were not the defined target group anticipated from the start of the project. Therefore, other ways of finding out the critical user group's needs had to be customized. This was done by asking questions about what the participants would imagine the critical users to need. For those who had a relative or friend they could relate to, this appears to be easier to imagine. This could probably be further researched, maybe even with other users than the elderly. This study might be used as a guide on extracting information and learning about one user group and working with another in participatory activities. Also, the adapted research methods that have been used in this project could potentially be suitable for future engagement of the elderly in similar research.

10.3 Concepts and guidelines as final delivery

A conflicting insight about guidelines is that the elderly appears to want concise messages with explicit and detailed information in an easy-to-understand language. This issue may not be that easy to solve and has not been explored in detail in this study, which would thus be interesting to explore further. On the other hand, the focus in this project was on creating ideas for alternative ways of communication and general guidance on

how to include the elderly in crisis information in the future, which also has been delivered. Still, it would probably be necessary to perform an even more in-depth study on refining the guidelines. It may even be possible to further develop the guidelines to some sort of checklist for designing future crisis messages as a tool for communicators and authorities.

Concerning our concept proposal, the drone is an interesting concept as it supplements "Hesa Fredrik" and could reach areas that do not have an outdoor signal today. However, it could be questioned if the drone could fly in difficult weather conditions, and maybe its primary purpose would be to inform about other types of crises than investigated in this project. If put into practice, the sound of this concept and "Hesa Fredrik" may need to be investigated. Some elderly mentioned that it can be hard to hear "Hesa Fredrik" and the signal today, but also because it is hard to know how a call-out message between warning signals would work outdoors. Therefore, the extent to which people can perceive and comprehend a called-out message outside needs to be further explored.

The chat group was also a concept that opened up to unexpected questions and created opportunities for social collaboration and networking that would benefit, especially those living alone in cities, as countryside supporting neighborliness was stronger during this research. On the other hand, understanding how a chat group works can be complicated for those less digital who might not understand how to use it. However, society and also elderly seem to become more digital as technology advances. Therefore, this might be a generation issue. The crises investigated in this study will affect those growing up today who will be old in the future and probably will have a different relationship to technology compared to the elderly defined and involved in this study. However, the question is if future technologies will include those with disabilities in a better way than today.

Something that needs to be considered about the concept proposals is that they are new inventions that need to be explained for people to understand them. Hence the proposal of including them in the "If Crisis or War Comes" brochure. This might be a good way to inform, as people are already familiar with the previous brochure. On the other hand, people may not save it and could be too lazy to locate it digitally in an emergency. In that case, the idea of preparative information collapses. It would thus be good to explore further if the information could be sent out as a brochure digitally in different ways or be spread through other channels. Another possible direction is to investigate other ways to teach citizens how to act on different signals and messages.

10.4 Transferability to other user groups

Adapting crisis information to the extreme users could potentially make crisis information and channels more inclusive and user-friendly for all. Also, the proposed concepts meet needs that previously have not been covered when communicating crisis information, allowing for more options and flexibility.

The audio SMS covers several universal design principles as it is intuitive and ensures that information reaches users without them actively opening the message, making this concept more user-friendly. The same goes for the chat group, which automatically invites the users to the channel. Concerning this, the question of whether those who are more digital would be annoyed by automatic functions remains. However, a voice message in a crisis could be annoying for those who do not need it. Similarly, those with more severe impairments like reduced eyesight often already have aids for reading aloud. So, it would be necessary to investigate further if these aspects could be conflicting or a disadvantage for them. Furthermore, it is not certain that people born with disabilities have the same needs as elderly users with impairments.

Moreover, there is a fine balance to what extent people wish to be informed in a crisis and how independently they want to remain. However, in an acute crisis, the inclusion of all society members is indeed something to strive for. Therefore, the guidelines combined with the proposed concept can contribute to more general improvements in the communication of crisis information, benefiting the greater society.

10.5 Fulfillment of sustainability goals

The sustainability goal 13.3 is reached by proposing alternative ways of communication and existing channels and guidelines for communication, thereby increasing resilience in society, and improving crisis management. Goal 10.3 is considered to be reached by taking action to ensure more inclusive crisis information for the elderly. This could also eliminate inequalities for other groups and contribute to equal future crisis communication for all". However, this would need further investigation, as the proposed solutions are theoretical and have not been validated in real situations.

10.6 Fulfilment of ethical considerations

When it comes to ethics, the insights from the user studies clearly showed that the elderly had very individual and different opinions about crises and different needs during workshops. Some participants were very active during discussions, whereas others needed more time to think about questions or needed the questions to be repeated to understand. Therefore, in this project, all methods were adapted to consider the differences in the best way. An effort was made to create a sense of trust by clarifying that all ideas were allowed during discussions. It was also discovered that the participants could talk more freely if someone else wrote down their thoughts during, for instance, evaluation sessions. Another consideration was made during the Emotion workshop by letting the participants talk about others' needs using a persona as a mediating tool. The persona made it easier for the participants to discuss disabilities which can be considered a sensitive issue. During all participatory activities, alternative approaches to exercises were prepared beforehand if the participants felt that something was difficult. One example of this was making it easier for participants to talk and discuss their ideas thought instead of them writing themselves. By doing so, the participants could entirely focus on verbally explaining their thoughts and ideas.

11 Conclusion

In the conclusion the project's two research questions are answered, finishing with a bullet list of conclusions that can be drawn from the work.

This exploratory study aimed to investigate how crisis information could become more inclusive towards the elderly in a situation of climate-related crisis. It was also to understand crisis communication today and investigate potential differences in the countryside and islands compared to cities. Today, crisis information is communicated through TV, Radio, SMS text messages, and the outdoor signal "Hesa Fredrik" in Cities.

Through participatory research, theoretical study of literature, and contact with authorities, the study found social and situational, behavioural, and expectational aspects as well as content and clarification of messages to consider in terms of crisis information. It also identified several groups of elderly that could be more exposed in a crisis. The groups to consider were: Elderly living alone in cities with few social contacts and those with impairments or who are less digital. To meet the needs of these groups, concepts of alternative ways and channels of future crisis communication and guidelines were proposed. The suggested concept is a combination of Audio SMS, an update of the outdoor signal Hesa Fredrik communicated with drones, and a chat group, all described and supported in an updated version of the brochure "If Crisis or War Comes". This combination can make crisis information more inclusive for all.

Based on the discussion and result presented, the following conclusions can be drawn:

- Alternative ways and channels of communication can meet the needs of a variety of elderly users, but also make crisis information more inclusive for all.
- The elderly appears to want concise but informative crisis messages with detailed and explicit content in a simple and easy-to-understand language.
- The elderly wants to receive preoperative information but do not worry about the consequences of crises beforehand.
- The audio messages can be more inclusive for the elderly with impairments or who are less digital, as it is sent directly to the user and read out loud automatically.
- The drone concept could work as a supplement to "Hesa Fredrik" to reach the countryside and islands which do not have an outdoor signal today.
- The chat group concept can create opportunities for neighbourhood cooperation in crises in the future, especially for those living alone with few social contacts close to home.
- Using scenarios, mediating tools, and engaging participants in the design process is necessary to explore future crises.
- It is possible to work with one user group and adapt participatory research methods and questions to find insights about other hard-to-reach user groups.
- Because of the war situation in Ukraine and little experience of climate crises in Sweden, it was difficult for participants to focus on climate-related crises.

Together, the concept proposals and the guidelines will provide guidance for organizations and authorities responsible for communicating crisis information. In addition, this project can be used as a reference framework for adapting and using participatory methods to engage participants when investigating future and sensitive issues.

12 Recommendations

The following chapter contains recommendations of further research and development that emerged from this project.

The following chapter contains recommendations of further research and development that emerged from this project.

Based on discussed issues and the concluded results, the following points of further research and development are recommended:

- The proposed concept would need to be further developed and tested to investigate if they are applicable in the future, both in terms of function and fulfilling the needs of the defined users. It is crucial to explore the reactions to the concepts in real situations and the behaviours in digital forums.

- The guidelines proposed in this project should be further developed. Possible future development could be to form the guidelines into checklists or frameworks together with responsible authorities.

- This study provides ground for further participatory research and investigation of other creative methods and mediating tools. One suggestion would be to explore methods to simulate more realistic severe crises with participants.

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Appendix

This chapter contains information about actors and participants involved in the project, the guides used internally and during participatory research and implementations of some of the concepts. All the guides and material used during participatory methods are in Swedish, as the study was conducted with participants who had Swedish as their primary language.

Appendix 1. Target Group and Actor selection

This appendix contains characteristics and demographics of different actors (table Y) and elderly involved in the project (table A1).

Table A1. Actors involved in the project.

Participant ID	Type of method	Time	Demographics & Characteristics
1	Semi-structured interview	1 hour	Man, Communicator at Municipality in Sweden
2	Semi-structured interview	1 hour	Man, Rescue service manager, Gothenburg,

Table A2. Seniors involved in the project.

Participant ID	Type of method	Time	Demographics & Characteristics
Pilots	Web Survey	2 hours	Woman and man, both aged 75+, living in a housing area in Gothenburg city. Engaged in different kinds of activities for seniors.
3-7	Unstructured group interview	1 hour	Women aged 74+, living in a smaller part of Gothenburg, the majority living in single households.
8-13	Focus group 1	1,5 hours (incl. coffee break 20 min)	Men, aged 76-83 (median 78), living in Styrsö in Gothenburg, all of them lived there for several years, 50% of them are locals.
14-16	Focus group 2	1 hour	Women, aged 78 -86 (median 82), living on Styrsö, Donsö and Brännö in Gothenburg. One of them moved in (+ participant number 1).
17-21	Workshop 1	1,2 hours	3 Men, 2 women, majority aged 80+ (one man aged 65 with Asperger), living in Gothenburg metropolitan area
22	Telephone interview	1 hour	Woman, 78 years, living alone in central Gothenburg. Has reduced eyesight (Glaucoma),. Regularly goes to courses where she learns about digital tools.
23	Telephone interview	30 min	Man, 74+ years. Reduced eyesight due to eye disease. The disease recently made him almost blind. Hence, he needs to use voice reading services such as Siri to be able to perceive information. 40 years' experience using computers and digital tools.
24	Telephone interview	40 min	Woman, 77 years, recently moved from central Gothenburg to an island. He lives alone. Finds herself digitally experienced.
25	Telephone interview	50 min	Man, above 75 years. Lives in Gothenburg city, with his wife and partly on an island. Finds himself to be digitally experienced (phone and computer).
26	Telephone interview	1 hour	Man above 80, live alone in an apartment in Gothenburg city. Has a summer place on an island. Has a mobile phone and uses it for checking messages. His son helps him with it and installations of channels on the TV because that is something he finds difficult.

Appendix 2. Interview Guides with Actors

The following appendix contains the interview guides used during interviews with actors.

Emailed questions to municipalities in Sweden

- Har ni statistik/rapport på hur någon krissituation hanterades i er kommun och vad folk tyckte om kommunikationen under krisen?
- Har ni själva gjort någon undersökning om hur kommunikationen fungerat till äldre under kriser?
- Hur säkerställer ni att äldre som tex har nedsatt syn eller hörsel får tillgång till viktig information framför allt under en pågående kris (exempelvis gällande evakuering)?

Guide Rescue service manager in Gothenburg

- Hur ser kommunikations och informations förloppet ut på plats under en krissituation? (Hagfors)
- I vilken ordning sker kommunikation och räddningsaktioner ute i fält?
    - vem informerar vem?
- Hur skiljer sig informations förlopp beroende på vilken typ av krissituation man befinner sig i?
- Hur det är att möta äldre som kanske bor själv och som behöver extra stöd i en krissituation?
- Hur beter sig folk ni möter i krissituationer?

Guide Municipality communicator

- Är det du som formulerar meddelanden? Eller gör ni det i en krisgrupp tillsammans?
- Har ni som kommun frihet vad gäller hur ni kommunicerar till era medborgare i kris, dvs kan det skilja sig mellan kommuner?
    - Vet du om ni har gjort någon speciell anpassning/har egna rutiner?
- Vad vi förstår från styrdokumentet gällande krisinformation som du skickade, ingår kommunikatören i krisledningsgruppen som har som ansvar att analysera och information och kommunikationsbehov. Här ingår det att avgöra vilka kanaler och information som behövs utifrån de som är utsatta:
    - Har ni då med någon i gruppen som ser till att informationen som går ut är tillgänglig för alla (även personer med exempelvis sämre syn, hörsel)?
    - Hur avgör ni vilka kanaler som ska användas och information som behövs?
    - Följer ni upp på något sätt om informationen har nått fram?
- Hur säkerställer ni att informationen ni skickar ut är, korrekt, lättbegriplig och målgruppsanpassa?
- **Scenario:** Om det skulle brinna i ett område där ni vet att det bor många äldre hur agerar ni i krisledningsgruppen då med att skicka ut information för att säkerställa att den verkligen når fram?
    - skulle ni göra något för att anpassa handlingssätt?
- Nu var inte du med i hanteringen av information i bränderna som var, men tog ni några lärdomar av vilken information som nådde fram bäst till alla i berörda områden?
- Hur extrem måste en situation vara för att man ska ta till extra åtgärder som exempelvis dörrknackning för evakuering?
    - Om en person inte kan hjälpa sig själv hur ser man då till att den kommer i säkerhet?
- Ger ni uppmaningar kring hur folk ska bete sig i en viss krissituation?
    - Vet ni om folk har följt dessa rekommendationer?
- Har ni olika handlingsplaner och följder som skickar ut information i stegvis beroende på vilken typ av krissituation det är? (exempelvis skiljer det sig om det är storm eller brand)

Appendix 3. Web Survey Questions

The following appendix contains the questions asked in the web survey. The survey was distributed online using Microsoft Forms.

Bakgrundsfrågor:

1. **Hur bor du?**

(Tillsammans med min familj/sambo, /Själv/Annat/)

2. **Hur gammal är du?**

(75-79/80-84/85-89/90-94/94+)

3. **Var bor du?**

(På landsbygden (få till inga grannar på gångavstånd) /I stad/Mindre samhälle/Annat)

4. **I vilket län bor du?** (Välj alternativ i listan)

(Sveriges 21 län)

5. **Har du något hjälpmedel som gör det lättare för dig att ta till dig information?** (Flera alternativ kan väljas)

(Glasögon/ Hörselapparat/ Inget/Annat)

Information vid kris

6. **Söker du aktivt efter information vid en krissituation?** (exempelvis om det brinner i ditt närområde eller är strömavbrott)
   (Alltid/Oftast/Ibland/Sällan/Aldrig)

7. (Följdfråga till fråga 6, alternativ: Alltid, Oftast, Ibland): **Vad för information söker du då?** (Skriv gärna i listform)

   (Följdfråga till fråga 6, alternativ: Sällan, Aldrig): **Hur kommer det sig att du sällan eller aldrig söker information vid en krissituation?** (Skriv gärna i listform).

8. **Vilka kanaler använder du oftast för att uppdatera dig om nyheter i samhället? (välj högst 3 alternativ)**
   (TV/Radio/Sms/Samtal med vänner/familj, /Epost/Via sociala medier (exempelvis Facebook, Instagram)/Text TV/Hembesök (exempelvis hemtjänster informerar)/Webbsidor)

Information vid brand

Nu kommer vi att ställa några frågor kring ett framtida krisscenario: En skogsbrand har startat i ditt närområde. Genom fönstret ser du en massa rökbildning längre bort i området. Du behöver stänga dina fönster och hålla dig uppdaterad på förändringar.

9. **Vilken avsändare har du störst tilltro till i en sån här situation?**

(Staten/Kommunen/Myndigheter (Exempelvis Polis, Transportstyrelsen, SMHI)/Räddningstjänsten/MSB/Privatpersoner)

10. **Vilken kanal är ditt förstahandsval att få information igenom i denna situation?**
(TV/Radio/Sms/Samtal med vänner/familj,/E-post/Via sociala medier (exempelvis Facebook, Instagram)/Text TV/ Hembesök (exempelvis hemtjänsten informerar)/Webbsidor)

11. **Varför vill du få information genom just denna kanal?**

12. **Vilken information skulle du vilja ta del av för att du ska känna dig trygg i en sån här situation?**

Avslutande frågor om information vid kris

13. **Har du tagit del av krisinformation någon gång?** (Med krisinformation syftar vi på läges uppdateringar vid en allvarlig storm, översvämning eller brand som berör eller väntas beröra dig).
(Ja/Nej)

14. **Är den information som skickas ut vid krissituationer idag tillräcklig enligt dig?**
(Ja/Nej)

15. (Följdfråga till fråga 14, alternativ: Ja) **Vad tycker du är bra med den information som skickas ut idag?**

16. (Följdfråga till fråga 14, alternativ: Nej) **Vad skulle kunna bli bättre med den information som skickas ut idag?**

17. **Finns det något mer du vill tillägga eller förtydliga som är viktigt för dig gällande krisinformation?**

18. **Fick du hjälp av någon med att fylla i denna enkät?**
    a. (Ja/Nej)

Appendix 4. Guide Focus Groups.

Upplägg:

Ansvariga: 1 moderator och 1 sekreterare.
Dokumentering: Ljudinspelning (efter godkännande av alla parter), skriftliga anteckningar under tillfället (verbala och ickeverbala observationer).

Inledning:

- Beskrivning av projektet (syfte, mål och hur resultatet ska användas)
- Beskrivning om vad detta tillfälle innebär och förväntningar på deltagarna
    - Ni diskuterar olika frågor i grupp tillsammans
    - Höra era tankar och idéer relaterade till extremväder.

Agenda för dagen

Etik & Samtycke

- Det ni pratar om här kommer att vara anonymt och vi kommer inte att nämna någon privat information som namn.
- Ge fråga om lov att använda några citat i rapporten från gruppdiskussionen
- Be om muntligt godkännande av inspelning.
- Allas åsikter är relevanta och viktigt att alla kommer till tals, det finns inga felaktiga eller rätta svar på de frågor vi ställer
- Vi är väldigt tacksamma för att ni är här, men vi vill även säga att det är frivilligt att vara med och om det är så att någon av er inte vill vara med så förstår vi det.

- Namnrunda -

Ice-breaker: Vad tänker ni på när ni hör krisinformation?

Tema 1 - Översvämningsscenario:

(Stadie 1) Tänk er att en allvarligare storm med medför risk för översvämning i göteborgs skärgård är på gång. Byarna blir alltmer hårda. (bild som stöd)

- Vad förväntar ni er för information i detta fall?

Stödfrågor:

- *Är det någon av er som har varit med om en kris på grund av extremväder som tex en kraftig storm eller översvämning? Dela gärna era egna erfarenheter med varandra lite kort.*
- *Från vem får ni information om vad som händer och vad ni ska göra?*
- *Hur tror ni att information kring händelsen skulle sprida sig till de som bor på öarna?*
- *Har ni några egna informationskanaler?*
- *Hörde ni hesa fredrik i måndags?*

(Stadie 2) Om vi nu säger att ett viktigt meddelande VMA (IPA) går ut till allmänheten via radio och TV, med uppmaning om att hålla sig inne och uppdaterad om situationen.

- Finns det någon som ni tror inte skulle nås av den här informationen? Varför inte?
- Spelar det någon roll vilken avsändare som skickar ut informationen? Har ni mer tillit till någon särskild?

Stödfrågor:

- *Elavbrott? Kommer någon att bli mer utsatt än andra? Hur ser det ut på de mindre öarna? (tex. Köpstadsö, Vrångö). Vilken information kan skapa mer trygghet? Varför?*
- *Hjälper ni varandra på något vis? Grannsamverkan.*

(Stadie 3 - only focus group 1) Den starka blåsten från stormen har orsakat elavbrott på framför allt Styrsö, Donsö och Köpstadsö. Ännu finns ingen prognos för när strömmen beräknas vara tillbaka.

- Har ni några idéer på hur man kan nå ut med lägesinformation till alla på öarna nu?

Stödfrågor:

- *Kommer någon att bli mer utsatt än andra? Hur det det ut på de mindre öarna? (tex. Köpstadsö, Vrångö). Varför? Vilken information kan skapa mer trygghet?*

- Fikapaus -

Tema 2 - Enkät diskussion:

Citat----------

1. Något som ofta förekommer i enkätsvaren är att krisinformation ska innehålla **"Tydlig och klart motiverade råd och anvisningar till ledning om vad man behöver göra för att skydda sig"**
   Stödfråga: Vad innebär detta för er?

---

1. (Only focus group 1) En person uttryckte att det har **"Blivit svårare att bedöma trovärdigheten med många aktörer"**
   Stödfråga: Håller ni med om det?

---

1. Här har vi ett citat där någon undrar hur man kan nå dem som inte hör bra under en kris "**Vid alarmering om krig, undrar jag hur samhället tar hand om dem som hör dåligt. Numera gör jag det och jag undrar om detta når fram genom alla väggar och nedsatt hörsel. Kommer det larmet dessutom på natten att kunna väcka mig???**"
   Stödfrågor: Kan det vara ett problem, att få krisinformation om man till exempel hör eller ser dåligt? Hur kan man nå ut i så fall?

---

1. Många har också nämnt att det är viktigt att krisinformationen "**når ut snabbt och att den är mer lokalt förankrad"**
   Stödfråga: Vad är era åsikter om detta?

Avslutning

Appendix 5. Guide Emotion Workshop

Upplägg:

Ansvariga: 1 moderator och 1 Antecknare/Assistent (A).
Dokumentering: Ljudinspelning (efter godkännande av alla parter), skriftliga anteckningar under tillfället (verbala och ickeverbala observationer), fotografera deras händer + fotografier av övning utan att visa ansikten.

Introduktion (5-10 min)

- Beskrivning av projektet (syfte, mål och hur resultatet ska användas. Utelämna detalj om klimatkriser utan håll det större här)
- Beskrivning om vad detta tillfälle innebär och förväntningar på deltagarna
    - Idag: Workshop - ni får diskutera lite olika frågor tillsammans och göra några små kreativa övningar
    - Handlar om att få era åsikter och synpunkter om vad ni tycker ät viktigt när det kommer till information vid en krissituation
- Förklara vår arbetsfördelning: 1 moderator och 1 antecknare
- En lära känna runda (vi börjar)
    - Vilka är ni? Känner ni varandra sedan tidigare?

Agenda för dagen

Etik & Samtycke:

- Be om muntligt godkännande av inspelning.
  (A: sätt på inspelning om godkännande ges)
- Ge fråga om lov att använda några citat i rapporten från gruppdiskussionen.
- Allas åsikter är värdefulla och viktigt att alla kommer till tals, det finns inga felaktiga eller rätta svar på de frågor vi ställer
- Vi är väldigt tacksamma för att ni är här, men vi vill även säga att det är frivilligt att vara med och om det är så att någon av er inte vill vara med så förstår vi det.

Del 1 - Card sorting (15 min)

Uppvärmningsövning.
(A: Täcka av bilder och justera bilderna)

Instruktion:

- Tanken är att ni ska få använda de bilder ni ser framför er!
- Vi vill att ni tillsammans under 10 minuter väljer ut 5 bilder ni associerar med en krissituation.
- Tala gärna om för varandra och för oss hur ni tänker när ni väljer ut bilderna.
- Är det ok om vi fotograferar era händer och bilderna ni väljer (inga ansikten)
  Stödfrågor:
    - *vilka bilder representerar känslor*
    - *gå på det första ni spontant tänker när det gäller kris*

(M: Instruera deltagarna att lägga ut bilder på förgjort ruta)

Stödfrågor:

- *Varför valde ni dessa bilder?*
  - *likheter/olikheter?*
  - *Var det nån bild du vill välja som ingen annan ville ha, varför ville du ha den?*
- *Vad är det värsta som kan hända i en kris för dig tror du?*

(A: Fotografera bilderna)

- Utifrån samma bilder, vill vi nu att ni på 5 minuter väljer ut de 5 bilder som ni förknippar med trygghet i en kris.

Stödfrågor:

- *Varför valde ni dessa bilder?*
  - *likheter/olikheter?*
  - *Vad är det viktigaste för dig för att du ska känna dig trygg i en kris?*

- Fikapaus (ca 15) -

Del 2 - Utforska potentiella känslor och reaktioner i en krissituation (25 min)

Instruktion:

- (Pratat om olika kriser) - Vi har fokus på klimatkriser såsom allvarligare storm, översvämning och skogsbrand eftersom dessa på grund av klimatförändringar kan komma att bli vanligare i framtiden.
- Då det kan vara svårt att tänka sig hur en sådan kris kan vara kommer vi att börja med att visa er ett scenario med en översvämning.
- I samband med detta kommer vi att göra en liten diskussionsövning.

2.1 Det börjar regna.

- Visa filmklipp. (M: läs följande i takt med filmen):
  - Det börjar regna allt mer där ni bor.
  - Nyheterna varnar för stora vattenmängder
  - Allmänheten rekommenderas att hålla sig uppdaterad på väderförändringar
  - och att inte ge sig ut i onödan.
  - Efter ett dygn har vattenmängderna ökat och du kan se hur vattnet har stigit.
  - Du börjar tänka att det nog snart kan bli svårt att ta sig ut.
  - Det plingar till i din telefon. Det är ett VMA (IPA) till allmänheten från MSB.
  - Det är stor risk för översvämning i ditt bostadsområde och du uppmanas förbereda dig för evakuering.

(A: Gå tillbaka till en lämplig bild som de kan diskutera till)

- Circumplex of emotions:
  - Nu tänkte vi göra en liten övning där ni ska få sätta ut de känslor ni tror att ni skulle känna i en sån här situation, en känslocirkel som var och en av er straxt kommer att få.

(A: Ge alla varsitt papper med Circumplex of emotion skala på)

  - Skalan går från positivt till negativt, ju mer rött → desto mer negativt och ju mer grönt → desto mer positivt. I mitten lite mer neutralt.

(M: läs alla snabbt för deltagarna)
(A: Ge alla varsin färgpricks-”karta”)

- Ni får alla nu en prick med en färg. Vi vill att ni, var och en, sätter ut er prick där ni tror att ni skulle befinna er känslomässigt. I just det här scenariot vi såg på filmen!
- (Ge ett exempel på hur man kan sätta ut en känsla - kan vara mitt-emellan två känslor också…)
-

(Ge dem lite tid att sätta ut)

När de har satt ut sin prick:
Nu är ni har satt ut era prickar, får ni gärna förklara hur ni tänkte och jämföra mer varandra (diskutera gärna!)

Stödfrågor:

- *Känner ni alla samma sak?*
- *Varför tror ni att ni kommer känna just så?*

2.2 Förvärring & Evakuering. (Folk som vadar i vatten, lämnar sina hem, evakuering).

- Visa filmklipp.
  - Nu har läget börjat bli kritiskt!
  - På radion berättar de att vattennivån höjts ännu mer.
  - 1500 hushåll är redan isolerade.
  - Du får ett nytt VMA(IPA) med en uppmaning att evakuera.
  - Strax därpå hör du att det knackar på din dörr.
  - När du öppnar står där en man från räddningstjänsten.

- Circumplex of emotions:
  - Utifrån det ni nyss sett (igen - var och en av er) sätt först ut en prick där ni tror att ni skulle befinna er känslomässigt när situationen förvärras och sedan en för motsvarande känsla(or) vid evakueringen.

(Ge dem lite tid att sätta ut, när de har satt ut sin prick)

När de har satt ut sin prick:
Nu är ni har satt ut era prickar, får ni gärna förklara hur ni tänkte och jämföra med varandra (diskutera gärna!)

Stödfrågor:

- *Känner ni alla samma sak?*
- *Varför tror ni att ni kommer känna just så?*

Reserv verktyg – del 2 (I stället för *Circumplex of emotion diagram*)

Dela ut följande utskrivet på ett A4 papper om diagrammet är svårt att förstå:

Spänd Ängslig Stressad

Upprörd Ledsen Håglös

Nedstämd Trött Lugn

Avslappnad Fridfull

Förnöjsam Alert Exalterad

Upprymd Glad

Del 3 - Översätta till andra personer (förstå hur man kan hjälpa de med mer funktionsnedsättningar) (10 min)

(A: Lägg fram Post-it + pennor. Skriv vid behov vad deltagarna säger. Lägg ut skrina post-its så att deltagarna enkelt kan laborera med dem/kanske fylla på med någon post-it själva om de vill.)

- Nu har vi ju pratat en hel del om hur ni tror att ni skulle känna i en krissituation och vad för info ni skulle vilja ha.
- Men det kan ju vara svårare för någon som inte ser eller hör så bra att få krisinformation eller större risk att missa informationen som går ut. Därför tänkte vi nu höra med er om vad ni tror är viktigt för någon som kanske har sämre syn, hörsel när det gäller att få information i en krissituation.
- Vi tänkte i göra det lite enklare att föreställa sig genom en persona som vi kallar Arne (Läs punkter om Arne)
    - Vad ni tror är viktigt för honom när det gäller krisinformation i samma krisscenario (översvämning som ni just såg)?

Stödfrågor:

- *Finns det något som man hade kunnat göra så att hon/han får informationen till sig/förstår den bättre?*
- *Är någon information viktigare vid ett visst tillfälle?*

(A: Skriv ned deltagarnas tankar på post-it lappar)

Avslutning (5 min)

Appendix 6. Guide Telephone Interviews

This appendix contains the questions asked during the telephone interviews.

(Förklara syfte och fråga om lov att spela in samtalet).

- Berätta gärna lite kort om dig själv innan vi går in på frågorna.

- För ett tag sedan skickades det ut en broschyr "om krisen kommer" till alla medborgare i Sverige. Minns du den? Om en ny sådan skulle skickas ut idag, hur hade du helst tagit emot den informationen?
    - På papper eller via andra källor?
    - Varför genom den källan?

- Tror du att mobiltelefonen kan vara ett bra hjälpmedel för att uppmärksamma om en allvarligare kris sker?
    - Eller tror du det finns andra kanaler som är bättre/mer effektiva?

- Vad tycker du är viktigt när man sänder ut meddelanden vid en pågående krissituation (exempelvis allvarligare storm, brandutveckling i ditt område) via:
  (tänk utseendemässigt, en kanal åt gången)
    - Radio för att det ska vara lätt att höra, förstå vad som sägs?

    - Tv för att det ska vara lätt att se, förstå och vara tydligt?
      (tänk textremsan som brukar poppa upp i tv-rutan)

    - SMS för att det ska vara lätt att läsa, se och förstå?

- Hade du tyckt att det känns bättre att få krisinformation från få avsändare, eller tycker du det är bättre att krisinformation skickas från så många avsändare/källor som möjligt?
    - Varför?

- De vi hittills har pratat med verkar tycka att det är viktigt att krisinformation tas på allvar, men samtidigt tycker många att det är viktigt att informationen inte skrämmer upp dem. Vad tycker/tänker du om det?

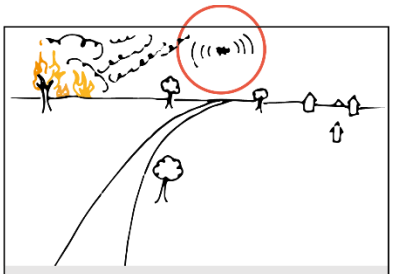
- Av de seniorer vi pratat med har det framgått att de som bor på landsbygden ofta har väldigt god grannsämja och hjälps åt att informera och hjälpa varandra under kriser. Hur är det där du bor?

- Vad tänker du om att man idag lite tar för givet att alla har en mobiltelefon och använder den regelbundet?
    - Vad tror du är viktigt när det kommer till krisinformation för att nå ut till de som inte är så digitala?

Appendix 7. Storyboard Concepts

In this appendix an overview is given of the storyboards created. Each concept were originally presented on 1 A3 page.

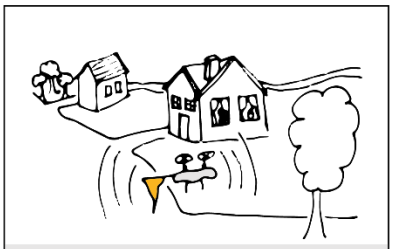
The Drone



En brand sprider sig och är påväg mot ett bostadsområde. Man kan se en drönare påväg. En signal kan anas på håll.

Senioren Anders sitter ovetande och läser en tidning när han hör en ljudsignal utifrån. Han börjar undra vad det är.

Anders ställer sig vid ett fönster och ser en drönare med en flagga utanför. Ljudet hörs nu väldigt tydligt.

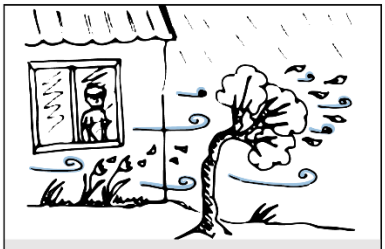


Drönaren cirkulerar i området för att varna alla.

Anders kollar upp vad flaggan innebär i en broschyr från MSB. Det är tydligen dags att förbereda sig för evakuering.

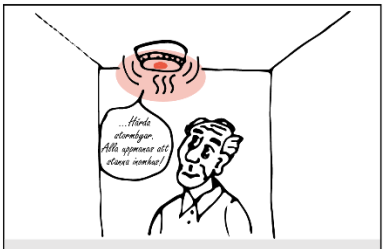
Enligt intruktionen tar Anders bara med sig det ytterst nödvändiga. Han känner sig väl förbered och vet vad som förväntas av honom.

The Fire Alarm



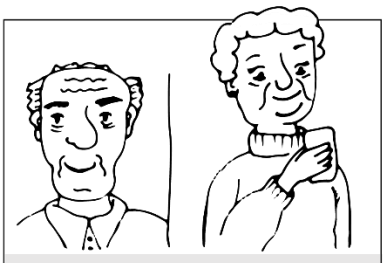
En allvarlig storm drar in över ett bostadsområde en förmiddag i maj. De boende se träd falla ned. Plötsligt går strömmen.

SOS- alarm sänder ut ett meddelande via de drabbades brandvarnare.



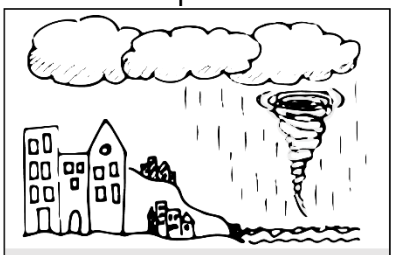
Lars ser ett ljussken och hör hur någon pratar i rummet bredvid. Det är ett VMA som läses upp av hans brandvarnare.

Grannen Siv ser att hennes brandvarnare har börjat att blinka men hör dåligt och uppfattar därför inte vad de säger.



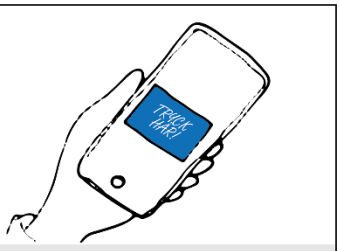
Siv läser mer i ett SMS hon fått från MSB. Både hon och Lars känner sig trygga. De kommer att få den information de behöver.

The Group Chat



En kraftig storm är påväg in från havet mot Göteborg. Det varnas för orkanbyar.

Ulla står och vattnar sina blommor när hon hör hur hennes telefon vibrerar och plingar till.



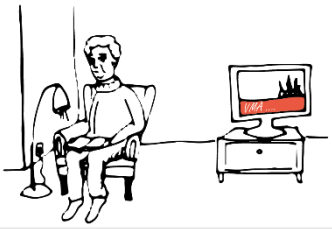
På telefonskärmen ser Ulla en knapp med en instruktion. Denna blinkar långsamt.

Ulla trycker på knappen. Hon får då en förfrågan om att gå med i en chattgrupp med hennes grannar som bor i närheten.

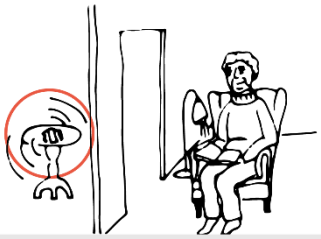
Hon tackar ja till inbjudan. Ulla kan nu läsa hur andra grannar har det och ställa frågor till dem om hon vill.

Ulla bestämmer tillsammans med grannarna på våning 3 att de ska dela med sig av sina resurser för att klara stormen.

The Talking phone-IPA



Det sker en brand i ett närområde. Ett VMA har gått ut via TV, radio och sms men Ingrid som sitter och läser har missat informationen.



Branden börjar sprida sig allt närmare. Ingrids telefon i rummet bredvid börjar vibrera, låta och blinka.

Ingrid hör att något händer i det andra rummet. Hon undrar vad det är och går dit för att se vad som står på.

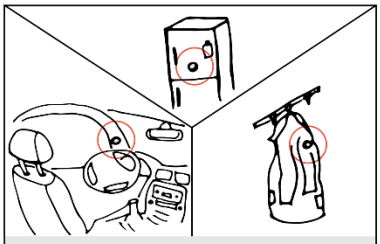
Väl framme vid sin telefon kan hon höra att ett VMA läsas upp från telefonen. Hon kan läsa meddelandet samtidigt.

Ingrid vet nu vad hon ska göra i situationen och stänger sina fönster. Hon känner sig tacksam för det automatiska meddelandet.

The Crisis Alarm

Roland har sett på TV att MSB rekommenderar inköp av små krislarm. Han är nu och införskaffar dem i mataffären.

Väl hemma plockar han upp de 3 krislarmen. Han ansluter dem enkelt till sin telefon via inställingar i SOS-appen i hans telefon.



Roland placerar ut de tre larmen på produkter han använder dagligen och därför har hög uppsikt på.

2 veckor senare ... Alla tre larm börjar plötsligt att blinka och tjuta. Roland har närmast till den i köket och går dit.

Roland letar upp sin telefon och ser att han fått en notis om pågående brand i närområde i SOS-alarm appen. Han läser mer om läget.

Han stänger av alla larm genom att trycka på ovansidan av ett av dem.

Appendix 8. Guide Co-design and Evaluation workshop

Upplägg:

Ansvariga: 1 moderator och 1 Antecknare/Assistent (A).
Dokumentering: Ljudinspelning (efter godkännande av alla parter), skriftliga anteckningar under tillfället (verbala och ickeverbala observationer), fotografera deras händer + fotografier av övning utan att visa ansikten.

Introduktion

- Presentera oss och beskriv projektet
- Beskriva tidsupplägg

Agenda

- Vad gjorde vi förra gången?
- Idag ska vi göra en övning där ni ska få hjälpa oss att tänka till om lite olika delar av kris meddelanden.
- Vi avslutar med att ni får kolla på några av våra idéer och ge feedback på dom.

Etik & Samtycke:

- Be om muntligt godkännande av inspelning.
- Ge fråga om lov att använda några citat i rapporten från gruppdiskussionen.
- Be om muntligt godkännande att fotografera under workshopen
- Alla tankar och idéer är välkomna: inget är rätt eller fel under dagens workshop.

Övning 1

- Ni ska nu få göra en övning som består av några olika steg. Vi kommer ta ett steg i taget och börja med att läsa upp den situation vi ska arbeta kring:
    - Ni befinner er här i Tuve där ett VMA, gått ut via radio P4, TV: Viktigt meddelande till allmänheten i Göteborgs kommun i Västra Götalands län. Det brinner i ett skogsparti öster om Tuve i Skogome. Räddningstjänsten uppmanar alla som befinner sig i området att gå inomhus och stänga dörrar, fönster och ventilation. För mer information lyssna på Sveriges Radio P4 Göteborg.

Skapa 2 olika koncept tillsammans i grupp utifrån följande steg.

1. Utformning av meddelande (1 förslag + original)
(M: läs först upp förslaget för deltagarna, sedan originalet)

Meddelande:

Viktigt meddelande till allmänheten i Göteborgs kommun i Västra Götalands län:

- Boende i Tuve Lillhagen ska utrymma västerut mot Tuve centrum
- Utrymning ska ske så fort som möjligt.
- För mer information om spridning och evakuering lyssna på Sveriges Radio P4 Göteborg.
- Du kan även ringa 113 13 för information eller om du ej kan evakuera dig själv.

Stödfrågor:

- Vad tycker ni om det här meddelandet?
- Hur tänker ni kring tydlighet?
- Saknar ni något?
- Kan det bli mer informativt?

(A: visa originalet) Hur upplever ni det i förhållande till originalet?

2. Kanal för meddelande (välj kanal för att erhålla valt meddelande) (M:läs upp alla alternativ för dem först)

- (Det meddelandet ni tyckte var bäst) På vilket sätt/hur skulle ni helst vilja få det?
- Välj bland alternativen ni ser på korten framför er. Ni kan välja ett sätt eller kombinera dem.
- Ni kan även komma med egna förslag/kommentarer

(M: ta med de korten de väljer tills nästa del)
(A: skriv ned kommentarer och deras egna alternativ på cerise post-it lappar)

3. Hur kan meddelandet skapa mer uppmärksamhet?

- Om ni tillsätter ett ljus, på vilket sätt hade det påverkat meddelandet? Vi har här några förslag (läs varje)
- Tror ni att eller eller en kombination av dessa ljus hade skapat mer uppmärksamhet?
- Hade det gjort meddelandet mer allvarsamt? (läs upp de olika ljusen)
- Vad tror ni om en ljudsignal? (A: demonstrera ett ljud åt gången)
- Ni kan även skriva era egna förslag på blå post-its

4. Finns det något man kan göra för att användare lättare ska ta till sig meddelandet? (M: läs alla gröna kort)

- Har ni något eget att tillägga här?

5. Knyta samman allt: sätta in i ruta

- De(n) kombination som ni nu valt, tror ni att detta koncept hade fått er att känna er i kontroll i situationen?
- Hur hade den fått er att känna er trygga?
- Är det något som saknas/behövs som ni vill lägga till?
- Känns meddelandet trovärdigt när ni får det på detta sätt? På vilket sätt?
- Hur får kombinationen er att ta meddelandet på allvar?

(A: fotograferar korten och skriver ned idéerna på bruna post-it lappar, så att de kan välja bland alla alternativ vid repetition av övningen. Sedan läggs korten tillbaka).

- Nu gör vi det igen fast ni ska nu försöka komma fram till en annan idé. Ni kan välja några kort som är samma men idén måste skilja sig från den förra på något sätt.

6. Utvärdera & Jämföra idéerna

(A: skriver ned på post-it (rosa resp. grön) lappar vad de säger gällande respektive koncept)

- Som sista steg på denna del ska vi göra en liten utvärdering
- där ni ska få prata om "positivt" och "negativt" gällande era idéer.
- Vad tycker ni om era idéer ni skapat? (Läs en idé i taget)

    - Stödfrågor (lägg fram frågekorten och läs ett i taget):
        - Fungerar idén i alla situationer? (tex både naturkriser (orkan, översvämning, brand, snöstorm), kriser orsakade av människa: krig/kravaller etc)
        - Finns det någon grupp i samhället (nedsättning i hörsel, syn, rörelse, minne, ålder etc) som inte kommer att nås av informationen om den förmedlas på detta sätt? (Hur hade det kunnat bli bättre?)
- Utifrån det ni sagt nu, vilken idé tror ni mest på? (varför)

Övning 2 (Nedprioriterat i mån av tid, men hanns med)

Utvärdering av 4 koncept via storyboards

- Ni ska nu få utvärdera några av våra koncept/ideer.
- Vi har satt in våra idéer i korta berättelser med påhittade karaktärer för att skapa lite sammanhang. Jag kommer nu att läsa ett i taget och sedan har vi lite frågor till dem. *(Använd frågekorten)*
    - *Vad tycker ni om den här?*
    - *Är det en bra ide?*
    - *Hur tror ni att det skulle fungera?*

Har ni något annat i hemmet som ni och andra använder och som ni tror att VMA meddelanden kan gå igenom vid en kris?

Appendix 9. PNI-Concepts

This appendix provides a summary of the internal PNI evaluation that followed the co-design and evaluation workshop with seniors (table A3).

Table A3. Internal PNI evaluation.

Concept	*Positive (+)*	*Negative (-)*	*Interesting (i)*
The Fire Alarm 	+ It is general knowledge that fire alarms are placed so that they can be heard throughout the home + Both the visually and hearing impaired can be noticed (i.e., light and sound) + Can operate in rural areas and where there is no outdoor signal	- Not everyone has a fire alarm that works - the user needs to be indoors - You need to supplement with something for those with hearing loss - May take time to implement as a standard	i - How to make the light visible during the day/bright room lightning? i - Is it possible to create a new standard for fire alarms with this addition?
The Chat Group 	+ Future seniors will understand what a chat group is Vibration can be useful for those with visual impairments	- Today's seniors might not understand how to behave in a chat group	i - Should residents be able to choose who to chat with? i - Will disinformation be spread through this channel? i - In a severe crisis, will people expose their weaknesses to strangers? i - When is it appropriate for the group chat to appear?
The talking phone-IPA 	+ Does not require digital skills, active decisions or much physical handling + Useful for both visually- and hearing impaired (voice + text).	- The message can be missed if the phone is uncharged/ suffer from severe hearing loss - Everyone might not have/are able to charge and keep track of a phone	i - Would repetition of the message be positive or negative? i - Future wise, how will it work together with existing aids for the visually impaired?
The Drone 	+ Might be useful in the countryside as it can reach difficult terrain + Can warn residents about more local, minor, events	- Difficult to see flag at a distance - Resource intensive (e.g., many drones are required for everyone to see them, someone needs to control it) - Might be difficult to see during daylight if a light is used instead of flags - Requires a long range to be used effectively in rural areas - Requires good weather conditions	i - Could light advantageously be used to support the hearing impaired? i - Flag, light or just a sound signal, how will people understand how to act? i - What sound can be used that is loud enough and associated with danger but different from other warning sounds (e.g., ambulance, flight alarm)?
The Crisis Alarm 	+ Can be placed outside the home (e.g., on a jacket, in the car) + No need to actively look at TV/listen to radio	- The user needs to keep track of battery status and where the plops are (can be misplaced in a bag etc) - Based on connection	i - Provides the ability to choose the type of alerts you want (e.g., only emergencies or minor local events)

Appendix 10. Improved brochure

In this appendix a suggestion of what modifications to MSB's folder "If Crisis or War Comes" could look like. The modifications are marked in blue, on three pages in the original folder from MSB.

Emergency preparedness

Together in crisis

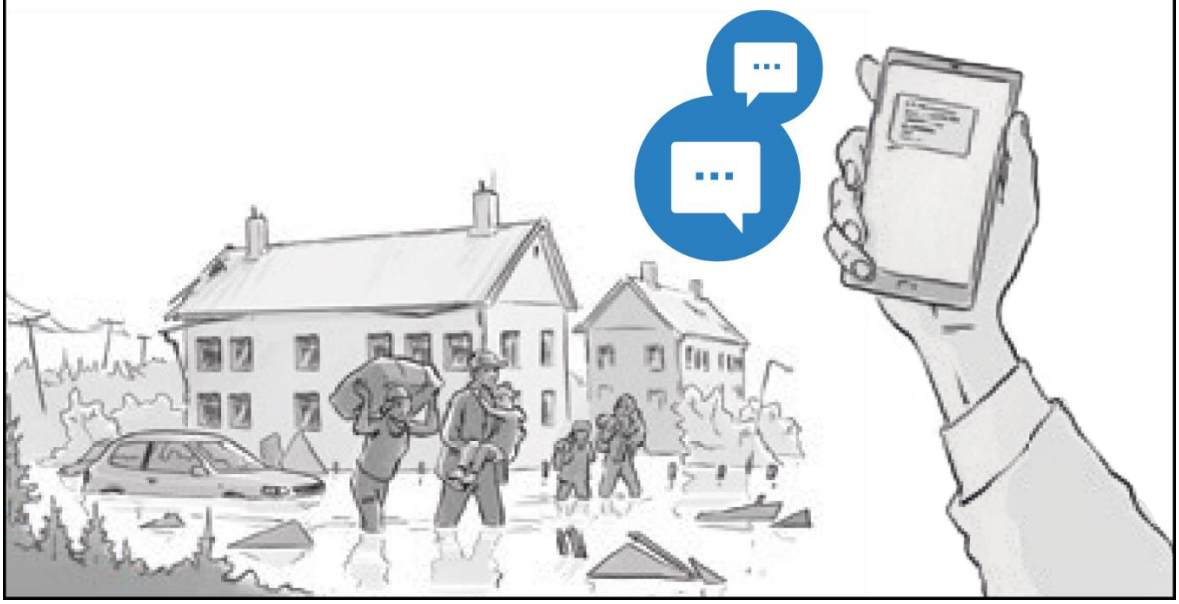
Neighborhood cooperation

It is important to help each other out in in a crisis. Not everyone may be reached by information or have the necessary resources to manage the situation. I for instance, if there is a power shortage make sure your neighbors and friends are safe. Help each other out by sharing resources like, food water or extra power batteries.

In a situation that requires evacuation, make sure to in firsthand rescue yourself, if the situation is not acute you may help rescuing others.

Safety Chat

In case of a crisis situation that can be predicted, you will receive an invite to a chat group where you can connect to your neighbors if you are affected by the situation. If you don't want to be in the chat, you can leave it.



Important public announcement

Signal 7 seconds – Voice message 14 seconds

7 14 7 14

Danger over

Unbroken signal 30 seconds

30

Warning systems

Important public announcement

The warning and information system IPA (important public announcement) is used in emergency situations – for example in the event of emissions of hazardous substances, fires where there is a risk of explosion, forest fires and other natural disasters.

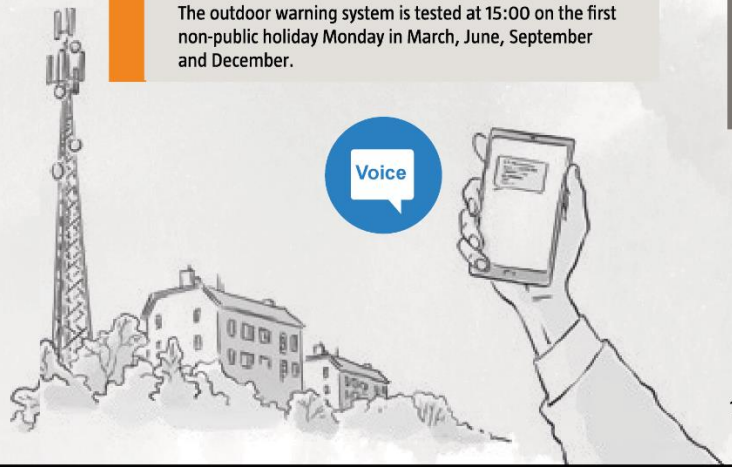
Important public announcements are broadcast primarily on Sveriges Radio's radio stations, Sveriges Television's TV channels and SVT's teletext system. IPAs can also be sent as text messages to mobile phones within a specific area. **The text message will automatically be read out loud and repeated until you actively confirm that you have received the message.**

Outdoor warning

On rare occasions, the outdoor warning system ("Hesa Fredrik") is used. Facilities for the outdoor warning system are located in the majority of towns and cities and around Sweden's nuclear power stations. **In some areas, such as countryside, there are drones circulating around with the warning signal.**

If you hear the signal: go indoors, close windows, doors and ventilation and listen to Sveriges Radio's radio station P4, which is tasked with providing public information.

The outdoor warning system is tested at 15:00 on the first non-public holiday Monday in March, June, September and December.



DEPARTMENT OF INDUSTRIAL AND MATERIAL SCIENCE
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