AAL
PROGRAMME

Project HnnH

Deliverable D1.2

General Requirements, User Needs and Preferences and ethical/legal Principles

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Inhaltsverzeichnis

Project identification	
Duration	10 months (1 Feb. 2022 – 31 Oct. 2022)
Coordinator	Joan de Boer
Coordinator organization	Sprigs
Website	http://www.aal-europe.eu/projects/hannah/

Document identification	
Document identification	D 1.2
Leader of the deliverable	Christine Pichler
Work status	closed
Review status	closed

Autorship and review information	
Editor	Christine Pichler
Reviewer	Johannes Oberzaucher, Daniela Ströckl
Contributors	Christine Pichler, Manuela Perchtaler, Gabriele Hagendorfer-Jauk, Katerina Sidiropoulo-Janku, Johannes Oberzaucher, Daniela Ströckl

Deliverable info	
Description	Overview on possible Matching Algorithms, Parameter-Sets
Dissemination level	public
Deliverable type	Report
Original Due Date	30.09.2022

Change records			
Version	Date	Author (Organization)	Description
V1	01.06		Structuring
V2	14.07		Inclusion of Information from WP1 and WP2
V3	17.07		Alignement
V4	18.08		Inclusion Final Information
V5	22.09		Review and Feedback
V6	30.09		Inclusion of review and iteration information

1   Deliverable Overview

The objective of WP1 is to involve relevant ecosystem stakeholders and primary end-users (older people) in co-creating the platform requirements in an iterative fashion, based on their needs. Selected topics will be discussed on expert levels and connected to the co-creation results. WP1 will be related to all relevant technological parts of the HannaH system (hardware [smart speaker, smartphone app], AI-based matchmaking, user experience) as well as ethical principles and proof of concept scenarios as a base for future anchoring processes. The tasks are underpinned by principles of iterative User-Centred Design approaches and ethical guidance related to good practice in user involvement (two-fold informed consenting process, transparent user information concerning relevant results, data privacy, research exit strategy). In all tasks a clear process of informing (2 step) and consenting is implemented. Informed consent documents are based on standards in related AAL projects and ethical committee guidelines.
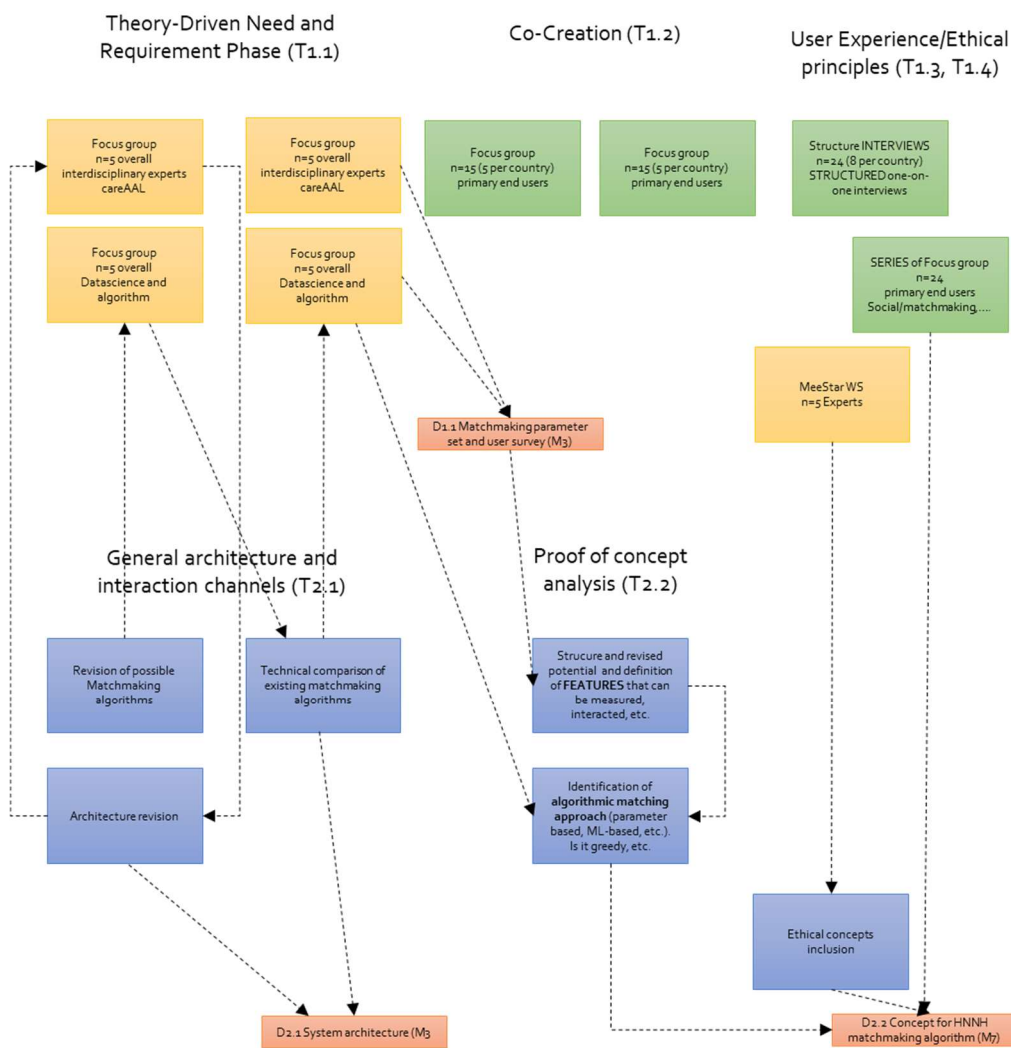
Figure 1: Overview on HnnH D2.2 relation to content creation

The deliverable D1.2 mirrors the results of HnnH tasks T1.1, T1.2 and T1.3 In addition it realizes the identification of features and estimation of decision potential as well as a revised estimation of data structures. The analysis will always be guided by an ethical revision and iterative discussion related to privacy, security and democratic challenges related to automated decision making in T1.4. It is related to the HnnH deliverable D1.1 and D2.1 (see also Figure 1)

The extended purpose of this deliverable is to examine existing matching algorithms and the fields of application to find suitable ones for social matching of seniors depending on different parameters. Definition of parameters important for social connection of elderly people is another goal of this project.

2   Overview on the requirements related to Primary end users (seniors)

In order to collect information about primary end users' needs and preferences, the HnnH project team planned to conduct two rounds of focus groups in each of the participating countries. The target group size for every discussion was n=5 and thus, in total, 30 primary end users were to be interviewed in the scope of two rounds of focus groups in three countries. In the end, the project team was able to recruit 33 seniors to participate in the focus groups. Figure 2 shows a detailed breakdown of end user focus groups per country.

As an addition to the focus group discussions, each country team was also tasked with conducting 8 one-on-one interviews with primary end users. Here the aim was to talk to 8 seniors per country, i.e., 24 people overall. Because all focus group participants were very eager to continue contributing to the project, they were included in the pool of potential interview candidates and additional candidates were recruited. Unfortunately, recruitment and subsequent interview scheduling proved exceedingly difficult because of people's unavailability due to the summer holidays. As a result, the country teams of the Netherlands and Austria were only able to conduct a total of 12 interviews, but these already brought research very close to the point of theoretical saturation, as the last few interviews yielded no vital new information. Figure 2 shows a detailed breakdown of end user interviews per country.

Included in the appendix are the two focus group protocols as well as the interview guideline, with the inclusion and exclusion criteria for potential participants.

Figure 2: Breakdown of HannaH end user focus groups and interviews

3   General requirements related to the input of AAL and care experts

In addition to focus groups and interviews with primary end users, the project team also sought out the expertise and opinions of people with professional experience in both the field of AAL and the field of care. The plan was to carry out 2 focus groups with 5 experts from various countries (the same experts in both groups) with CUAS from Austria conducting the discussions. The project consortium put together a list of potential candidates: 2 experts from Austria, 2 experts from the Netherlands and 1 expert from Norway. Due to great difficulties with people's availability, the first focus group was attended by only 3 of the experts. In several follow-ups, the remaining experts were asked to provide written answers to the questions that had been discussed in the focus group, but none replied. In order to make it easier for experts to participate, the second focus group was then changed in format from a discussion meeting to a written interview. Even after several friendly reminders, only 2 experts were able to provide written statements. Figure 3 shows a breakdown of the focus groups with AAL and care experts.

Included in the appendix are the focus group protocol and the written interview questions, with the inclusion and exclusion criteria for potential participants.

Figure 3: Breakdown of HannaH expert focus groups

Detailed overview on the method and output

Protocol focus group 1 seniors

Welcome (10 min)	**Introduction**
	Reason for coming together: discussion of new approach to strengthen and expand social networks of older adults
	Explanation of agenda
	Hosts and participants introduce themselves (state their name and a word or phrase to express how they are feeling w/r/t the discussion ahead)
Input (10 min)	**Introducing the topic**
	Presentation of the three scenarios from the project proposal:
	(1) Anna feels lonely today and notices that she does not know who to call. Anna experiences days like this. More and more, she realizes a gap between her existing social contacts and the ones she wants. On bad days she feels isolated and anxious about the future – the fear of having no emotional support and no one to talk to about how she feels. Sometimes Anna thinks about what to do to prevent this from happening.
	(2) Ben likes to be part of an active social network and always had many friends dating back to when he was a student and employee. Since retirement, he has noticed that the circle of friends is narrowing. Ben wants to bring back the same diversity in his existing social network. He wants to support and be supported in a broad and more diverse social network again – meeting new people to get new perspectives and share new experiences.
	(3) For years, Ivo was an active participant in the regular social events arranged by the municipality, retirement union, and former employer. Due to a physical handicap, it is not easy for Ivo to leave the house without help – and these social network coordinators enabled Ivo´s participation in a broader social network by sending him invites and providing free shuttle service. After a year of COVID-19 pandemic and social distancing, Ivo noticed how much he relied on these social network coordinators to include him in a social network beyond family and friends. After over a year with cancelled events due to the COVID-19 pandemic combined with a migrated family and few resources, he hopes that one day a social network

	coordinator will enable him to connect directly with a broader social network.
Discussion (30-45 min)	**Hosting of discussion** Short introduction of project HannaH During discussion, host notes down topics under discussion (Online: Flinga[1], offline: index cards on pinboard) **Discussion questions** First thoughts and ideas? In which situations would you use HannaH? How should HannaH work/look so that it can be used in everyday life? When you look at how HannaH interacts with Ivo – is there anything you would like to highlight, add or remove? What would prevent you from using HannaH? To be able to connect you with other people, HannaH will need to know some personal details about you. What would you be willing to share with Hannah? Age, gender, location, marital status etc.? Would you have any worries about this? How would you connect people and in which way would you do that?
Prioritisation (15 min)	**Rating** Participants rate their top 3 discussion topics (Online: by telling the host who takes notes; offline: by placing sticky dots onto the index cards on the pinboard)
Ending (15 min)	**Closing shop** Recap round and mention of top-rated topics Info about focus group in April Send-off

(80-95 min)

Materials needed

- Informed Consent
- Online:
  - Flinga account
  - PowerPoint presentation
- Offline:

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[1] https://flinga.fi/tools

- o   Pinboard
- o   Index cards
- o   Sharpie
- o   Sticky dots
- o   Camera/phone (to document results on pinboard)
- o   PowerPoint presentation/handout

Inclusion/Exclusion Criteria (Participant Profile) | Seniors

- Age: 55+ (highest possible age diversity)
- Gender parity
- No hearing impairments or speech impediments
- No cognitive impairments (e.g., dementia)
- No manifest issues with social competences or resulting loneliness
- Participants know about current technologies (e.g., smart speakers) in principle, but do not need to own or use them.

3.1 Protocol focus group 2 seniors

Welcome (10 min)	**Introduction** - Short introduction (why second round of FG etc.) - Looking back at the first round & explanation of agenda (show the PPP from Maya with the comic again) - Hosts and participants briefly introduce themselves (name + what I particularly remember from the last discussion)
Input (5 min)	**Introducing HannaH** Use slides from Maya again – especially the one about HannaH Give a short overview about the current status of the project and explain how this second round of the focus group is integrated in the project workflow
Discussion (45-60 min)	**Hosting of discussion** During discussion, host notes down topics under discussion (Online: Flinga[2], offline: index cards on pinboard) **Discussion questions** - What were your thoughts on HannaH since we last met? Have any thoughts come up? - How could people find HannaH or how could HannaH find people? - Which personal topics would you feel okay sharing with HannaH? Would you be willing to share your emotional state? Should HannaH recognise your emotional state on its own? - How would you feel about HannaH suggesting topics to talk about if she noticed a lull in your conversation with someone else? - Would you feel comfortable with your data being shared outside your home country (within Europa, globally)? - Should HannaH be a mobile or stationary device? Would you want to take HannaH with you or not?
Summary (15 min)	**Summary of the most important points** Host summarizes the most important points of the discussion and asks for additional thoughts (use offline pinboard/flipchart, online e.g. Flinga)
Ending (5 min)	**Closing shop** - Recap round and mention of top-rated topics - Info about further steps in the project - Send-off

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[2] https://flinga.fi/tools

(80-95 min)

Materials needed

- Online:
  - o Flinga account
  - o PowerPoint presentation
- Offline:
  - o Pinboard
  - o Index cards
  - o Sharpie
  - o Sticky dots
  - o Camera/phone (to document results on pinboard)
  - o PowerPoint presentation/handout

Inclusion/Exclusion Criteria (Participant Profile) | Seniors

- Attendance of first focus group or sufficient knowledge about contents of first focus group

Interview – Protocol

Introduction of the persons (in case you do not know each other yet)

Short introduction to the background/progress of the project/goal and purpose of the interview.

Explanation of the procedure: only a few questions, it is important for us to hear people's personal perspective, please share your thoughts "freely". (Interviewer asks questions in a very neutral way, don't use examples if not needed!)

Note on data protection: interviews will be anonymised, Informed Consent as written consent

Questions for the short interview (30 minutes in total):

Access and use (accessibility, business case)

- Would you please tell us what interests you most about technical communication tools?
- For which people do you think HannaH could be appealing?
- In what extend do you see HannaH as relevant for all age groups? (e.g. to accommodate scarce time resources or to promote support in social exchange)
- HannaH should be designed to connect people with each other: What do you think is necessary for HannaH to reach people?
  - Should it be made known e.g. through networks, intermediaries, associations?
  - Or should HannaH be sold freely in shops?
- What does it take for people to be able to access HannaH? To what extent would it be conceivable for HannaH to be offered, for example, as a stand-alone device or an app on the smartphone?

Shared occasion/topic exchange (parameters of match-making)

- Our interviews so far have shown that it is likely to take a specific topic to facilitate conversation between people who are strangers to each other. What content and topics do you think would be suitable for this?
- In your view, would groups on certain topics be conceivable here, in which people could then network with each other?
- What would it look like if HannaH asked its users about these topics/their interests?

Costs and service (business case)

- To what extent would you be willing to pay for a system like HannaH? How much would you be willing to spend (between 0 and 50€, between 51 and 80€)?
- How do you feel about offering Hannah as a free app on your smartphone?
- What kind of customer service do you expect? (business case)
- Thank you very much for the interview! Finally, would you like to say something that we did not go into, but that is particularly important to you?

Documentation and evaluation

Audio recording of the interview for internal documentation

Filling in the category scheme on the basis of a content summary of the relevant results incl. translation into English (see Excel-File)

Informed Consent from participants

8 seniors per country (it could be the same as in the FG + 2-3 new ones); same in- and exclusion criteria as FG

3.3 Protocol focus group 1 AAL/care experts

Welcome (10 min)	**Introduction**
	- Reason for coming together: discussion of new approach to strengthen and expand social networks of older adults
	- Explanation of agenda
	- Hosts and participants introduce themselves (state their name and a word or phrase to express how they are feeling w/r/t the discussion ahead)
Input (10 min)	**Introducing the topic**
	Presentation of the three scenarios from the project proposal:
	(1) Anna feels lonely today and notices that she does not know who to call. Anna experiences days like this. More and more, she realizes a gap between her existing social contacts and the ones she wants. On bad days she feels isolated and anxious about the future – the fear of having no emotional support and no one to talk to about how she feels. Sometimes Anna thinks about what to do to prevent this from happening.
	(2) Ben likes to be part of an active social network and always had many friends dating back to when he was a student and employee. Since retirement, he has noticed that the circle of friends is narrowing. Ben wants to bring back the same diversity in his existing social network. He wants to support and be supported in a broad and more diverse social network again – meeting new people to get new perspectives and share new experiences.
	(3) For years, Ivo was an active participant in the regular social events arranged by the municipality, retirement union, and former employer. Due to a physical handicap, it is not easy for Ivo to leave the house without help – and these social network coordinators enabled Ivo´s participation in a broader social network by sending him invites and providing free shuttle service. After a year of COVID-19 pandemic and social distancing, Ivo noticed how much he relied on these social network coordinators to include him in a social network beyond family and friends. After over a year with cancelled events due to the COVID-19 pandemic combined with a migrated family and few resources, he hopes that one day a social network coordinator will enable him to connect directly with a broader social network.
Discussion	**Hosting of discussion**

(30-45 min)	After presentation of scenarios, short verbal introduction of project HannaH During discussion, host notes down topics under discussion (Online: Flinga[3], offline: index cards on pinboard) **Discussion questions** - What experiences have you already had with promoting social exchange (opportunities, difficulties)? - When you look at how HannaH interacts with Ivo – is there anything you would like to highlight, add or remove? - What are the concerns about data entry, how should the technical implementation be designed to be suitable for seniors? - Under which circumstances would end users use HannaH? How should HannaH work/look so that it can be used in everyday life? - What would prevent end users from using HannaH? - How would you connect people and in which way would you do that?
Prioritisation (15 min)	**Rating** Participants rate their top 3 discussion topics (Online: by telling the host who takes notes; offline: by placing sticky dots onto the index cards on the whiteboard)
Ending (15 min)	**Closing shop** - Recap round and mention of top-rated topics - Info about focus group in March - Send-off

(80-95 min)

Materials needed

- Informed Consent
- Online:
  - Flinga account
  - PowerPoint presentation
- Offline:
  - Pinboard
  - Index cards
  - Sharpie
  - Sticky dots
  - Camera/phone (to document results on pinboard)
  - PowerPoint presentation

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[3] https://flinga.fi/tools

Inclusion/Exclusion Criteria (Participant Profile) | AAL & Care Experts

- Experience with community care approaches or coordinating social environments in combination with AAL solutions
- Proficient in English

3.4 Written interview questions AAL/care experts

Dear project HannaH experts,

Thank you to everyone who voted in the Doodle poll. Unfortunately, we are unable to find a date and time to get together as a group and discuss some more in-depth questions surrounding HannaH. This is why we have decided to switch to a written format. Below you can find 4 questions which we would kindly ask you to answer in writing.

1. What do you think is necessary for the implementation of HannaH, which structures (from the point of view of users and the technical development) have to be created so that HannaH can be used well?
2. In your view, how could intergenerational exchange be promoted through HannaH? What technical aspects need to be taken into account in this context?
3. The main purpose of HannaH is to help people establish social contacts and to counteract loneliness. If someone uses HannaH, they are in a way admitting to either being lonely already or at least having difficulties in establishing new relationships. The use of HannaH can thus be stigmatising. How would HannaH have to be designed to be as stigma-free as possible?
4. Finally, is there anything else important that you would like to share with us?

We would be grateful if you could send us your answers **until the end of June**.

As a refresher on HannaH, please find attached to this email the visualisation from the first round of the expert focus group.

We appreciate the time and effort you are willing to put into helping us make HannaH a successful project.

Thank you and kind regards,

Manuela Perchtaler & Christine Pichler

4 HannaH's general concept and looks

4.1 Results of end user focus groups and interviews

Two focus groups (n=33) and a round of one-on-one interviews (n=12) with seniors yielded the following main categories of end users' preferences regarding HannaH's general concept and looks (Table 1):

Table 1: End users' preference regarding HannaH's general concept and looks

End users' preferences regarding HannaH's general concept and looks
- The implementation of HannaH should happen in person, as should subsequent support. Local communities, clubs, institutions, initiatives, groups, apps and associations which already exist in communities could help with this. Volunteers (multipliers in the field) could help with setting up HannaH, which could bring together younger and older people (intergenerational approach). Older people could help others of their age group with the implementation of HannaH (participatory approach) (cf. chapter 1.2).   - HannaH needs a support hotline (with real people) in case a user has a problem.   - HannaH needs clear instructions on how to use it and a clear explanation what it can and cannot do/provide. It also needs to be made very clear that HannaH is not a human.   - HannaH should enable thematic conversations, possibly even in the form of group calls to all people who have previously joined a "HannaH club" surrounding a special interest (cf. chapter 1.2).   - HannaH should enable international conversations, if users specifically ask for them.   - The costs for using HannaH need to be made clear from the beginning (cost transparency). There should be different rates for users, or HannaH should be free and government-funded (cf. chapter 1.2).   - HannaH should be barrier-free and inclusive regarding its service and usability (universal design). It should consider the different possible life situations of its target group.   - HannaH could be a stationary or portable device (or both at the same time, e.g., a smart speaker with an accompanying smartphone app). People who are immobile may prefer a stationary device, people who are still very active may prefer a portable device (cf. chapter 1.2).   - HannaH should be advertised broadly within communities to garner new users, e.g., through multipliers.   - HannaH should make it possible for users who are leaving the service to provide feedback.

4.2   Results of expert focus groups

Two focus groups (n=5) with experts in the fields of both AAL and care yielded the following main categories of experts' preferences regarding HannaH's general concept and looks (Table 2):

Table 2: Experts' preferences regarding HannaH's general concept and looks

Experts' preferences regarding HannaH's general concept and looks
- Users have to build up a new routine when it comes to using HannaH. This will be essential. Users will need to see the sense behind using HannaH and the benefit they gain from doing so. Building trust in HannaH is most important.   - There should be a real person behind HannaH who helps with setting it up and support. This could be volunteers or older people themselves (cf. chapter 1.1).   - A large number of people should be using HannaH right from the start because new users will want quick (and suitable) matches. This can only be achieved by having a critical mass of people in the user pool of HannaH.   - Existing solutions (WhatsApp, Facebook etc.) are seen as strong competitions when it comes to finding new contacts.   - HannaH should offer various options of establishing contact (e.g., talking, writing) because people have different preferences and/or skills.   - Interactions may need specific topics in order to flourish. Talking to strangers about "nothing" or unspecific topics (communication without a common goal) will be very difficult for many. Contacts could be established around shared interests, which could also bring together people from different generations (cf. chapter 1.1).   - HannaH's language should be adapted to the language of older people. Sociological studies about "cultures of expression" may be useful here.   - Actively searching for new contacts and thus admitting to a certain degree of loneliness may come with the fear of stigmatisation. This could prevent older people from using HannaH. In marketing HannaH, special attention should be given to what the attractive returns can be from meeting other people with shared interests and hobbies via HannaH.   - In order to not create another digital divide, HannaH should not just be for older people but for younger people as well. This would, of course, entail new marketing challenges but showing people why and about what they could communicate via HannaH could alleviate some of these challenges (cf. chapter 1.1).   - HannaH should be a web-based solution and not a new, standalone device. It should be a smartphone app or an add-on to an existing smart speaker (cf. chapter 1.1).   - Because a service like this can only thrive if there are many users, HannaH must not cost anything. End users should be able to use it for free (cf. chapters 1.1, 2.1).   - HannaH can help create knowledge about which people have which interests. In community work, it is a challenge to approach people who are not organised (in associations). HannaH is perhaps more accessible for some and people are more likely to tell it what they are interested in. This can then be used as a database for offline networkers.

5 HannaH's architecture, safety and data security

5.1 Results of senior focus groups and interviews

Two focus groups (n=33) and a round of one-on-one interviews (n=12) with seniors yielded the following main categories of end users' preferences regarding HannaH's architecture, safety and data security (Table 3):

Table 3: End users' preferences regarding HannaH's architecture, safety and data security

End users' preferences regarding HannaH's architecture, safety and data security
• Data security needs to be at the forefront. Older people who may not know a lot about data security themselves need to be especially protected. HannaH should feature statements about cookies, tracking etc. (full transparency).   • Users should be the ones to decide when and how HannaH is used. Consequently, HannaH should have an on/off button to make absolutely sure it is not "listening in" constantly. It should be the users' personal decision to share data and what kind of data to share. Some users may be fine with sharing data for research and development/improvement of HannaH (cf. chapter 2.2).   • The automated detection of emotional states/emotional information is not welcome at all.   • Some users may prefer a paid service rather than a free service because they feel that if a service is free, the users and their data become the product (data security concerns) (cf. chapter 1.2).   • HannaH should be designed as a device independent from all other operating systems so as not to share data with a third party.   • HannaH should have the option to block people.   • HannaH should have an alarm function in case a user has a (medical) emergency.

5.2 Results of expert focus groups

Two focus groups (n=5) with experts in the fields of both AAL and care yielded the following main categories of experts' preferences regarding HannaH's architecture, safety and data security (Table 4):

Table 4: Experts' preferences regarding HannaH's architecture, safety and data security

Experts' preferences regarding HannaH's architecture, safety and data security
• Input via speech always offers security and privacy issues. Data and user information should be kept as local as possible. Clear feedback and interaction modules and interaction triggers have to be defined. Personalisation and localisation of the solution are of great importance (language, dialect etc.)   • Users – and their relatives – may have concerns about being constantly listened to ("bugged") and about what happens with their data (privacy and data security) (cf. chapter 2.1).   • Users should be able to define their own data limit (except for some very basic information). Especially people trying HannaH for the first time should be able to set their own "limit" on how much data they provide and HannaH should explain why it

wants additional and, potentially, sensitive data (i.e., to increase the chances of finding a suitable match) (cf. chapter 2.1).

6 Analysis concerning ethical principles / legal processes, MEESTAR study with experts

The objective of Task 1.4 is to define relevant ethical principles and suggestions for further development concerning them, as well as reflect on related legal processes that may influence the development and introduction in the use and market, such as GDPR regulations and general privacy matters, medical-product laws, country-specific and international ethical approval issues. In order to support the objective we conducted a MEESTAR model-based analysis with interdisciplinary panel of experts.

6.1 Preparation of the MEESTAR study

6.1.1 MEESTAR analysis and its suitability for the HannaH ethical considerations

The Model for the Ethical Evaluation of Socio-Technical Arrangements (MEESTAR) was developed in the team under the leadership of Prof. Dr. theol. habil. Arne Manzeschke within the project "Ethical questions in the area of age appropriate assisting systems" in 2013. It is being used as "guiding theoretical framework to assess relevant ELSI" (Schley & Balzer 2020: 105), ethical, legal and social implications. MEESTAR is well-structured tool that is helpful not only to detect ethically problematic sides of developed arrangements, but also its promising aspects and potential of supporting the ethical aspects of care, autonomy, safety, justice, privacy, participation and self-conception (ibid.). The MEESTAR model was also used in order to identify the importance of the different ethical dimensions in developing the robotic assisting system (Klein & Schlömer 2017). The MEESTAR model consists of seven dimensions of consideration on three levels, whilst they may be considered ethically safe or problematic in four stages, as depicts the following figure:

Figure 5: "MEESTAR: x-axis: dimensions of ethical evaluation; y-axis: stages of ethical evaluation; z-axis: levels of ethical evaluation." (Menzeschke et al. 2013: 14)
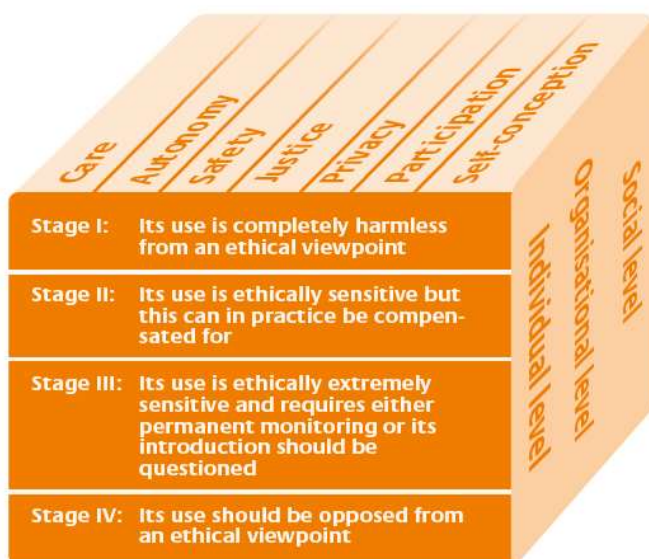
6.1.2 Interdisciplinary expert panel

In order to capture the complexity of ethical issues of the HannaH technology we composed a panel of seven researchers in the following fields: user design and software development, information technology, industrial engineering, disability and diversity studies, psychology, applied social sciences and sociology. We took care that our panel is both age and gender diverse.

Before the ethical interdisciplinary panel discussion, the participating members were shortly informed about the developed socio-technical arrangement and the goal of evaluation session. Since some of the panel members preferred online meeting, so after considering hybrid session, we did the fully online meeting with online data gathering support (survey tools of MS Teams and Padlet board). The session lasted 90 minutes and consisted of free discussions, structured questioning and moderated reflection of seven MEESTAR dimensions. At the end the participants were given opportunity to suggest possible steps in further development of HannaH.

6.2 Results

The overall evaluation of the HannaH result in the MEESTAR analysis across all its dimensions resulted in Stage II: Its use is ethically sensitive but this can in practice be compensated for (Menzeschke et al. 2013: 14). The technology was not in any of the ethical dimensions evaluated as extremely ethically problematic (Stage IV) and there was no suggestion to withdraw from further developing the matchmaking algorithm. On the contrary, new dimensions and possible development suggestions were generated during the MEESTAR analysis (see part 3. Further development of HannaH).

After short introduction of the HannaH (see Appendix), the ethical interdisciplinary panel members evaluated the socio-technical arrangement as either neutral, or not much ethically problematic, as can be seen in the Chart 1.

Chart 6: Overall estimation of ethical sensitivity of HannaH. n=7

How ethically problematic is in my perspective the HannaH technology?

Not much 29%

Neutral 71%

■ Not at all ■ Not much ■ Neutral ■ A little bit ■ Very much
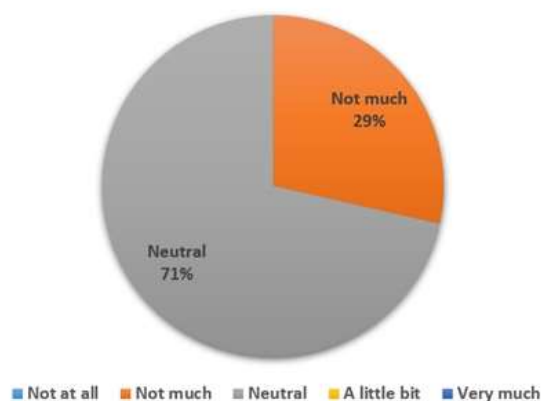
After the introductory overall estimation of the HannaH from the perspective of ethical sensitivity, we discussed the seven ethical dimensions with the help of 1-2 prompt questions for each dimension. The panel members had always first short individual time for reflection that was followed by the panel discussion. The overall reflected relevance and number of prompt questions of the ethical dimensions for HannaH by the ethical interdisciplinary panel is summarized below in Table1. Four ethical dimensions were reflected as of high importance by the MEESTAR ethical interdisciplinary panel: **care, safety, justice and privacy**. Autonomy, participation and self-conception were considered as of average relevance.

Table 7: Number of prompt questions and reflected relevance of seven ethical dimensions of MEESTAR study

End users' preferences regarding HannaH's general concept and looks		
Dimension	Number of prompt questions	Reflected relevance
Care	1	High
Autonomy	1	Average
Safety	2	High
Justice	2	High
Privacy	2	High
Participation	1	Average
Self-conception	2	Average

In the following analysis all the dimensions of HannaH will be presented in more detailed way, including the estimation of the ethical sensitivity on three individual, organisational and social level (Menzeschke et al. 2013: 20).

6.2.1 Care

The dimension of care was considered relevant on high level and slightly ethically problematic on individual level by the MEESTAR ethical interdisciplinary panel. HannaH may support social anxiety or lead to conflicting situations and thus be ethically problematic from the perspective of technically assisted care.

Table 2: Ethical dimension Care

Care / high relevance of ethical issues		
Prompt question: At what point is the technically assisted care of social contacts of lonely seniors problematic because it changes their relationship to themselves and to the world in ways that they do not want or that we should not wish for them? At what point does the technically assisted care of social contacts for lonely seniors become a patronising or negative paternalistic approach?		
Individual level	Organisational level	Social level
Stage III: The use of HannaH is extremely sensitive and requires either permanent monitoring or its introduction should be questioned	Stage II: The use of HannaH is ethically sensitive but this can in practice be compensated for	Stage II: The use of HannaH is ethically sensitive but this can in practice be compensated for
Explanatory statements/comments: • Using HannaH is problematic from the point when it captivates user's time and social resources solely for the digital exchange. It would be problematic if the system would be demanding / pressing on the use of technology and service behind it, e. g. like "You have to use HannaH x times a week to improve the algorithm". • Hannah may support social anxiety, if people wouldn't go out anymore and have even more of a need to stay in their own four walls because HannaH would be so time-consuming (because for example encouraging very long conversations). Professional caregivers or the family environment can assess difficult/critical situations/constitutions, but would user on their own be able to indicate it and deal with it? • It would be problematic if HannaH repeatedly asks intrusive questions or tries to enforce social contacts. • What happens in case of conflicts?		

6.2.2 Autonomy

The dimension of autonomy was considered relevant on the average level and not very ethically problematic by the MEESTAR ethical interdisciplinary panel. There was general agreement on the potential of HannaH supporting users´ autonomy, if it would be designed user-friendly and if the possibility to withdraw from unwanted contact without much hesitation would be introduced.

Table 3: Ethical dimension Autonomy

Autonomy / average relevance of ethical issues		
Prompt question: How can seniors be supported in their autonomy in the development of social contacts with the HannaH matchmaking algorithm?		
Individual level	Organisational level	Social level
Stage II: The use of HannaH is ethically sensitive but this can in practice be compensated for	Stage II: The use of HannaH is ethically sensitive but this can in practice be compensated for	Stage I: The use of HannaH is completely harmless from an ethical viewpoint
Explanatory statements/comments: • The autonomy of users can be developed if they can in general handle the technology well. Therefore, the onboarding phase should not be underestimated, including proper introduction of the technology use and detailed assistance towards the beginning of operating the system, and also the reduction of fear of technologies should be kept in mind. If the technology can be handled easily by users and they feel comfortable using it, it may encourage people to try something new, explore, and also empower them in their individual choices. Clearly communicate the meaningfulness of technology and its possibilities and limits. • Low-threshold design may ease encourage users to find like-minded people. • Wide access providing may be a technical issue. • When matchmaking, the opposite mechanisms, excluding someone from the contacts and withdrawing from unwanted, or no longer wanted contacts must be elegantly solved. Seniors must be given fast and simple opportunity to withdraw if the contact becomes "unpleasant" (even if this may be rude). • The technology-assisted contact matchmaking may lead to a feeling of being overwhelmed by technology. Self-control of the user regarding the contacts should always have priority to the contacts that may be suggested by the algorithm.		

6.2.3 Safety

The dimension of safety was considered relevant on high level and not very ethically problematic by the MEESTAR ethical interdisciplinary panel. Safety mechanisms like registration and proper introduction in the system are needed. Safety measures against too intense usage may limit the risk of digital dependency.

Table 4: Ethical dimension Safety

Safety / high relevance of ethical issues		
Prompt questions: How can we address the fact that creating security can sometimes limit existing capabilities? In other words, when people start relying on the HannaH matchmaking algorithm, they may stop caring about developing their social contacts themselves in a productive sense. How should technical assistance in establishing social contacts be evaluated, which increases the subjective feeling of security without objectively increasing security? (How do we resolve conflicts between security and privacy and between security and autonomy/freedom when using the HannaH matchmaking algorithm?)		
Individual level	Organisational level	Social level
Stage II: The use of HannaH is ethically sensitive but this can in practice be compensated for	Stage II: The use of HannaH is ethically sensitive but this can in practice be compensated for	Stage II: The use of HannaH is ethically sensitive but this can in practice be compensated for
Explanatory statements/comments: - The jeopardy of withdrawal from physical life while using technologies is as a general problem of assistance systems of any kind. - HannaH should always be marketed as one of a possible tools of socializing, not the only one. It is important to clarify expectations from HannaH at the beginning, and, if necessary, relativize them and communicate some optimal proportion of mediated and offline socializing. Technical assistance should probably really only be the starting point for social contacts, perhaps to get to know a larger number of people, of whom a few can then establish more intensive contacts in the non-virtual world. - The system may suggest breaks in case of 'too intensive' use and gives recommendations for activities 'in real life' (going for a walk, having a coffee with the neighbour, etc.). Maybe HannaH may actively suggest for offline socializing, but not in a paternalistic manner. For example, addressing the possibility of contact in-person in case people who have repeated encounters through HannaH live in physical proximity. Perhaps HannaH can give a person an overview, this is your monthly use of the system, give people reflection on how they harvested it, and thus also keeping them from "over-personalizing" the technology – I am here to help you, but I am not the sole solution to your loneliness. - The users should be informed in advance that no personal information should be exchanged in the conversation (assets, address, etc.). - HannaH as a platform must ensure that the people on the platform are real and correspond to the user's profile.		

- While introducing the device it should be clearly stated that HannaH is a platform, not a safe space and that users should maintain the "natural" scepticism of a real conversation here too.
- In order to prevent abuse, solutions are needed here (registration; meta-analysis of secure data, abuse report protocol).

6.2.4 Justice

The dimension of justice was considered relevant on high level and slightly ethically problematic on social level by the MEESTAR ethical interdisciplinary panel. The discussion opened a topic if systems like HannaH are public good and should be publicly supported, rather not, and therefore it also does not support justice, as regular payment may exclude many pensioners. At the same time, it could also keep "dubious" users away, so payment may perhaps support safety.

Table 5: Ethical dimension Justice

Justice / high relevance of ethical issues		
Prompt questions: How should using HannaH matchmaking algorithm be financed (who should pay, how much)? Who gets access to HannaH matchmaking algorithm? (Does HannaH matchmaking algorithm potentially influence the intragenerational and intergenerational justice?)		
Individual level	Organisational level	Social level
Stage II: The use of HannaH is ethically sensitive but this can in practice be compensated for	Stage II: The use of HannaH is ethically sensitive but this can in practice be compensated for	Stage III: The use of HannaH is extremely sensitive and requires either permanent monitoring or its introduction should be questioned
Explanatory statements/comments: • Depends on the sum; if you think of low-pensioners, even small amounts of money are already too much (e.g. 5-10€ subscription per month); also in view of the current inflation. A one-time purchase of the hardware and the service via public funds or donations should also be considered? I think that for many HannaH may be just a "toy" that they do not want to / cannot pay out of their own pocket • A platform is designed for many (unlimited) users; there are several possibilities: collect an annual fee. Special offer of insurance/care facilities for the elderly. Perhaps it would be an additional offer in the context of assisted living or mobile care, as it could be included in the current tariff. • Of course, not everyone can afford to pay regularly such a system, which is contrary to justice. • One should avoid that the benefit is reserved only for the better earners. • If HannaH costs users at least a small amount , this could keep "dubious" people away. • I think this is solely private matter, so I do not see the need to support the technology development from public resources. • Maybe it could be for borrowing in the public libraries, so people can try it for free and purchase then later if they really like it?		

6.2.5 Privacy

The dimension of privacy was considered relevant on high level and most ethically problematic from all the dimensions by the MEESTAR ethical interdisciplinary panel. The legal regulations regarding data privacy should be followed at the highest level, important aspect is also data storage, as little as personal data as possible should be stored. The algorithms may lead into stereotyping, therefore culturally-bound matchmaking should not be supported, but more research on the topic would be needed.

Table 6: Ethical dimension Privacy

Privacy / high relevance of ethical issues		
Prompt questions: When developing matchmaking algorithms like HannaH, how can user privacy be preserved as a general quality, moral right and legal framework? How can we introduce an age-appropriate assistance system such as HannaH for people with a migrant background and deal with cultural differences in the private and public sectors?		
Individual level	Organisational level	Social level
Stage II: The use of HannaH is ethically sensitive but this can in practice be compensated for	Stage III: The use of HannaH is extremely sensitive and requires either permanent monitoring or its introduction should be questioned	Stage III: The use of HannaH is extremely sensitive and requires either permanent monitoring or its introduction should be questioned
Explanatory statements/comments: - Transfer of sensitive data must be GDPR compliant and corresponding international law must apply / highest guidelines as a basis. The information about the effects on the algorithm must also be communicated. - The algorithm should work with as little sensitive data as possible, and store the data securely to be trustworthy. Only collect rough/large categories as algorithm parameters, no exact details such as address, marital status, children yes/no, religious affiliation, impairments, etc. - I see few possibilities to see through the technology from the user side, so that you know where, with whom, what information ends up about yourself. Adjusting settings requires quite a bit of technical affinity. - Migration background aspects should be taken into account in the parameter set, but it should not encourage racist tendencies or groupings. Algorithms may support stereotyping. - Do not address cultural differences in matchmaking. In the best case, a nice contact with someone forms and at some point the people come to the conclusion that they have different backgrounds, but the similarities predominate. It is interesting whether you only take into account the preferences of the users via the diversity variables, or are simply suggested by the system independently of it, so that you can also immerse yourself in "other worlds". - Simplify language (see App Capito by Atempo).		

- Migration background aspect is certainly a separate, further project.
- Involvement of people from different cultural backgrounds needs to be applied already in the development phase

6.2.6 Participation

The dimension of participation was considered relevant on the average level and at the same time as ethically unproblematic by the MEESTAR ethical interdisciplinary panel. HannaH may start socializing that may develop into more complex social relationships and users may activate each other. At the same time, the users may have different levels of participation need and that should be fine.

Table 7: Ethical dimension Participation

Participation / average relevance of ethical issues		
Prompt question: **To what extent do matchmaking algorithms like HannaH prevent or impede certain type of participation?**		
Individual level	Organisational level	Social level
Stage I: The use of HannaH is completely harmless from an ethical viewpoint	Stage I: The use of HannaH is completely harmless from an ethical viewpoint	Stage I: The use of HannaH is completely harmless from an ethical viewpoint
Explanatory statements/comments: - The target group of HannaH is restricted to those with general cognitive skills and competences, those who have basic affinity to technology use, courage to undergo some mistake-correction loops with technology use, and are comfortable to express themselves in the operating language of HannaH. - Whether you like someone depends on more factors than an algorithm can capture. It must be clear that we are using a limited set of parameters and misunderstandings may still happen; e.g. "I like cooking" can mean very different things. - Users can eventually encourage each other in participation in things in life that may not have been on the table at the initial point of conversation via HannaH . Perhaps HannaH may suggest people that made a match and are in touch more than once a common activity outside the house? - If group engagements would be possible with HannaH, people could organize and activate themselves there. - How about seniors suggesting their potentials, what they can help with (evening school, babysitting), if it goes the inter-generation way? - How much participation do the respective persons actually want ? There should be no over-promotion of people in terms of mobilization, e.g. for social purposes, associations. This may lead to a forced social obligation.		

6.2.7 Self-conception

The dimension of self-conception was considered relevant on the average level, and at the same time as ethically unproblematic by the MEESTAR ethical interdisciplinary panel. The support of social routines, intra-generational contacts and using new technologies may boost self-conception in a positive way. It is good thing that HannaH does not associate with medicalization.

Table 7: Ethical dimension Self-conception

Privacy / average relevance of ethical issues		
Prompt questions: What routines may HannaH help to establish in its users? (How is the question of meaning which tends to pose itself more in old age given space and per-spective within the socio-technical arrangements of HannaH?) How does HannaH respond to the tendency of medicalisation of life of the senior population?		
Individual level	Organisational level	Social level
Stage I: The use of HannaH is completely harmless from an ethical viewpoint	Stage I: The use of HannaH is completely harmless from an ethical viewpoint	Stage I: The use of HannaH is completely harmless from an ethical viewpoint
Explanatory statements/comments: - Fast, positive experiences from networking with firstly unknown people, as less physical networking can take place due to poorer mobility at focused age. This can also reduce the fear of use of new technology. Should some help be provided on how to get to socializing routines? - A regular daily routine, or at least fixed points in time, where you may meet friends at certain times, like daily coffee at 10 etc. Socializing routines strongly depend on the common interests, can also groups meet through HannaH (small book club or similar)? In-depth conversations, lifelong learning, exchange of knowledge on basic level. - Sharing daily routines may lead to degeneration of the social contacts and self-conception too, it would be good if the HannaH stays open (for example, that a new contact is tried out at least once a week), including the people from younger generation being invited to take part in networking. - Should not only address the question of meaning per se, but also generativity – desire to pass on something that will be my legacy for others, working across generations could lead to such meaning. - Regarding the self-conception, maybe it is good to keep in mind that not all old people are lonely. - The topic of medicalization is not very applicable to Hannah, because the fact "feeling lonely" or "wanting to have new social contacts" is not a diagnosis. - I think it is ok if the HannaH stays out of the dimension of medicalization, also because the seniors that would be using it may appreciate that there is some non-medicalized aspect of their lives.		

6.3 Further development of HannaH

At the very end of the evaluation session, the panel members addressed the possibility of using matchmaking algorithm in the future.

Chart 2: Estimation of own future use of matchmaking algorithm by panel members. n=7
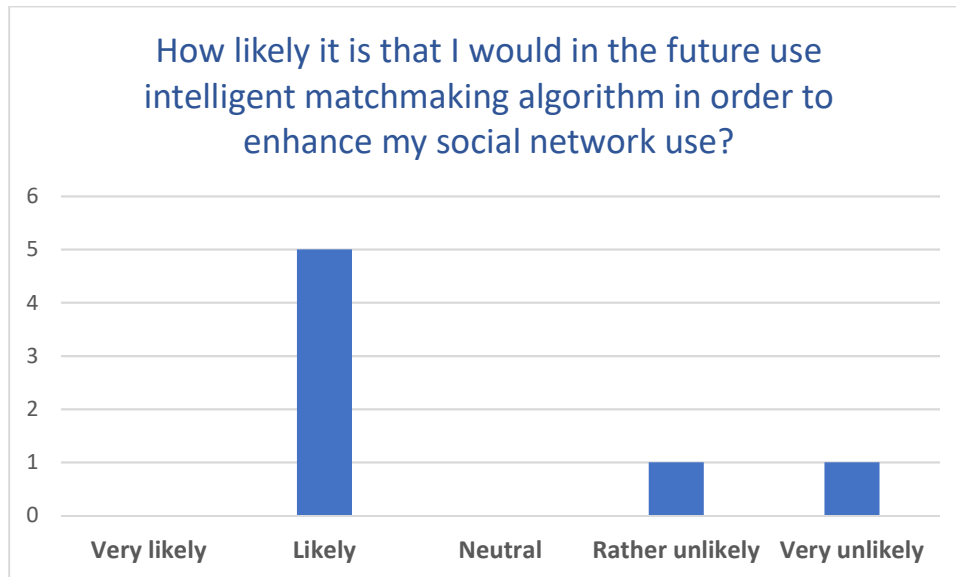
The results support overall positive evaluation of the HannaH, as most of the ethical interdisciplinary panel members voted for possible use of the matchmaking algorithm in the future.

Further, during assessing the seven ethical dimensions, as well as at the very end of the evaluation session, the MEESTAR ethical interdisciplinary panel members were encouraged to give the designers tips for further development of the technology. Here is the list of further development suggestions:

Table 8: Further suggestions for HannaH development

Further suggestions for HannaH development by the MEESTAR ethical interdisciplinary panel
• Integration of the existing social contacts of user into the HannaH.   • Considering introducing also intragenerational socialization possibilities within the system.   • The usage of HannaH may encourage users to give feedback so the system can be developed further.   • Simple compact training modules (perhaps including purely audio modules) to educate users on safe and efficient usage of HannaH.   • Follow-up programs that will equip people with needed competences to take care of themselves and indicate non-secure situations while using HannaH and how to operate in case this happens.   • The HannaH may have in-built option to learn/improve foreign languages during ongoing communication. Multilingualism (available on all pages, assumed?)

7 References

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