



## GOT-IT: A TOOLKIT FOR INCLUSIVE AND UNDERSTANDABLE LIFESTYLE DATA VISUALISATIONS IN EHEALTH SOLUTIONS

AAL-2020-7-51-SCP

# D1.2: Co-design

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## ABSTRACT

Deliverable 1.2 of the Got-IT project describes the lessons learnt on how to engage with older adults with low eHealth literacy in designing various visualisations. It is based on the outcomes of Tasks T1.2 and T1.3, performed by TUW and JOAFG (AT) and RRD and Pharos (NL) and their older co-designers, i.e. older adults with low eHealth literacy:

### **T1.2 Co-creation with older adults with low eHealth literacy [M1-M6]**

This task involved co-design activities with older adults with low eHealth literacy starting with the test case of daily physical activity using the Activity Coach application<sup>1</sup> developed by RRD. Our strategy involved photo explorations, iterative co-design and testing sessions, performed in NL and AT. Due to COVID measures, several activities were conducted online. Additional individual sessions were organised for agenda reasons.

1. The researchers recruited two co-design teams (N=11/country). They invited and instructed the members to take pictures of visualisations of dynamic data (e.g., blood pressure measurements or graphs in newspapers/magazines) they liked/disliked in their personal lives over a period of two weeks;
2. The researchers facilitated a first co-design session where the co-design team members showed their photos and reflected on them. The reflections mirror the pre-conceptions, needs and preferences of the target population concerning visualisation of data. The researchers drafted a list of these;
3. The researchers then used the above list to design data visualisations (low-fidelity prototypes) for the Activity Coach;
4. A subsample of the co-design groups (N=5-6 / country), discussed the new visualisations in a second co-design session. The researchers adapted the above list according to their feedback. One designer of eHealth solutions took part as an observer in one co-design session and later on attended a feedback session with the research team;
5. The visualisations were once more adapted and turned into a clickable lo-fi prototype of the Activity Coach to be used in a browser. This prototype then was explored within further co-design sessions with five participants/country gaining feedback on the interaction with the developed visualisations. The implementation of the lessons learned from these and previous sessions resulted in a functional prototype app.

### **T1.3 Development and evaluation of the high-fidelity prototype [M5-M8]**

Target users (N=5-6/country) used the high-fidelity functional prototype based on the mock-ups (developed in T1.2), in real-life for one week. The high-fidelity functional prototype was paired with a Fitbit wristband to collect data for the app, also given to the participants. The researchers facilitated the evaluation of their experiences in group and individual sessions. We subsequently updated the list of recommendations initiated in T1.2 for the CO-DESIGN section of the toolkit.

The outcomes (visualisations and lessons learnt) were integrated in the CO-DESIGN and TEST section of the toolkit. The lessons learnt address: (1) practical design criteria to be used by designers when developing eHealth visualisations (e.g., on the amount of information shown, the font size and colour of visualisations); (2) recommendations on how to engage with older adults with limited eHealth literacy when designing eHealth visualisations.

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<sup>1</sup> [https://play.google.com/store/apps/details?id=nl.rrd.activitycoach&hl=en\\_US&gl=US](https://play.google.com/store/apps/details?id=nl.rrd.activitycoach&hl=en_US&gl=US) [Online, last accessed: 1 Dec 2021]



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## SYMBOLS, ABBREVIATIONS AND ACRONYMS

3G-check	Check, if a person is either COVID-vaccinated, COVID-tested or did go through a COVID infection. At many places in Austria (incl. TU Wien) showing that you belong to one of these groups of people is a prerequisite to enter the place.
AAL	Active Assisted Living
D	Deliverable
DCHE	Danish Committee for Health Education
EC	European Commission
JOAFG	Johanniter Österreich Ausbildung und Forschung gemeinnützige GmbH
M	Month
PHAROS	Pharos Expertisecentrum Gezondheidsverschillen
RRD	Roessingh Research and Development
T	Task
TUW	TU Wien: Institute of Visual Computing and Human-Centered Technology – Human Computer Interaction Group
WP	Work Package

## 1 INTRODUCTION

D1.2 describes the lessons learned through the co-design process, as well as the co-design process itself throughout the project. The document is structured as follows:

In Section 2, we start with describing the co-design activities conducted during the course of the Got-IT project, detailing the preparations done for each activity as well as the setting in which the activity took place, followed by a description of the actual activities performed (procedure) and a summary of the lessons learned in regard to designing visualisations for people with low eHealth literacy and the co-design process itself.

Section 3 summarizes design recommendations for visualisations used in eHealth applications that have been derived from the co-design activities. Those recommendations are part of the TEST section of the Got-IT toolkit.

Finally, Section 4 presents the content for the co-design section of the Got-IT toolkit containing recommendations for planning and performing co-design activities, ethical considerations that should be taken care of in a co-design process and a summary of the co-design activities described in Section 2 as a show case for future designers of eHealth applications.

### Objectives

The main objective of D1.2 is to describe the lessons learnt throughout the project on how to engage with older adults with low eHealth literacy in designing various visualisations. This is based on the outcomes from T1.2 and T1.3. D1.2 also reports the CO-DESIGN component of the toolkit.

### Relation to other deliverables

The lessons learned as described in this deliverable, are based on the outcome from T1.2 and T1.3. D1.3 presents a checklist on the understandability and actionability of the visualisations designed, which is partly derived from the outcomes of the work described in the present document. D1.1 presents arguments for an inclusive approach from desk research and collaboration with healthcare professionals and reports on the workshop at the dHealth conference<sup>2</sup>, where the topics of co-design and data visualisations have been tackled by engaging with professionals. D1.2 adds to these presenting lessons learnt taking a practical perspective when engaging with end-users with low eHealth literacy.

D1.2 strongly relates to the toolkit itself (D2.1) as this is based on the work described in D1.1-D1.3. D2.2 ("Report on stakeholder engagement and dissemination activities") is related to D1.2, as some of the lessons learnt are presented in publications (i.e., presentations and academic publications) and on social media.

As ethics and research ethics are an integral part of and rationale for co-design and engaging with stakeholders, D1.2 is strongly connected with D3.2.1 and D.3.2.3 as well.

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<sup>2</sup> <https://www.dhealth.at>

## 2 GOT-IT CO-DESIGN PROCESS

We conducted co-design activities with older adults with low eHealth literacy in Austria and the Netherlands, starting with the test case of daily physical activities using the Activity Coach application<sup>3</sup> developed by RRD, an app to track daily physical activity including step counting, heart rate, and sleep. (see Figure 1) The app is paired with a smartwatch, in the project’s case, a Fitbit wristband<sup>4</sup>. (Figure 2)

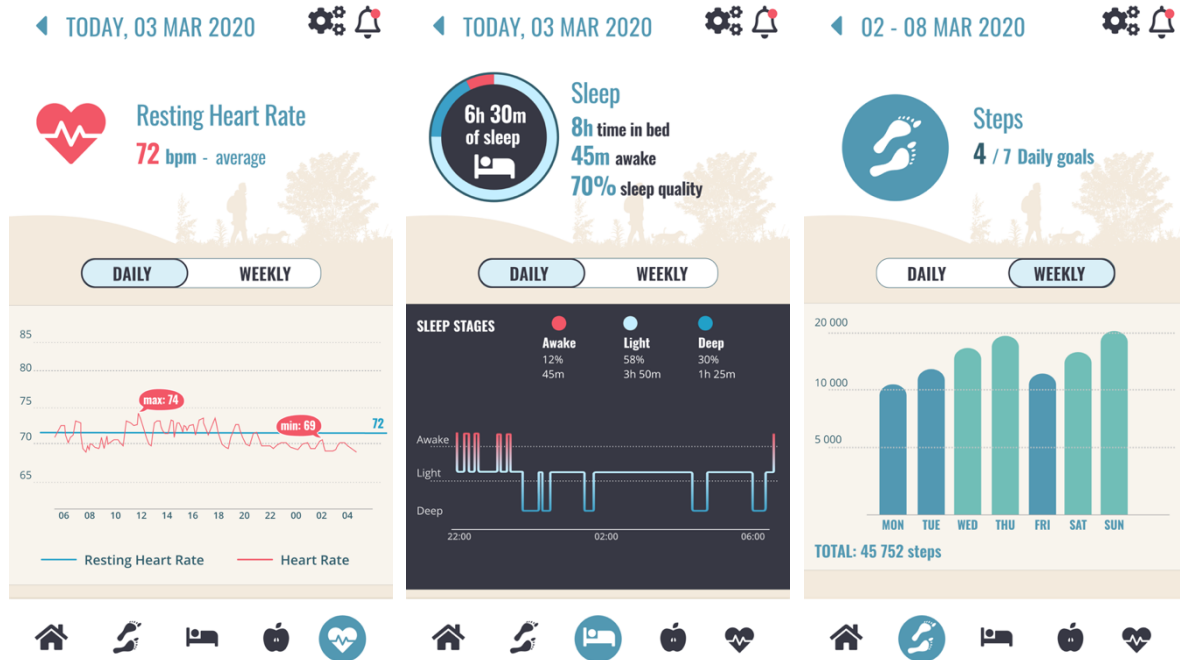


Figure 1: Sample screens of the Activity Coach app



Figure 2: Activity Tracker wristband by the Fitbit company

<sup>3</sup> [https://play.google.com/store/apps/details?id=nl.rrd.activitycoach&hl=en\\_US&gl=US](https://play.google.com/store/apps/details?id=nl.rrd.activitycoach&hl=en_US&gl=US) [Online, last accessed: 1 Dec, 2021]

<sup>4</sup> <https://www.fitbit.com/global/at/home> [online; last accessed: Dec 2, 2021]

We invited participants according to the following **inclusion criteria**:

- aged 55 or older
- cognitively able and legally competent
- able to contribute to the process/sessions
- access to an electronic device such as a smartphone, tablet, or computer and ability to use it
- low eHealth literacy as defined in D1.1

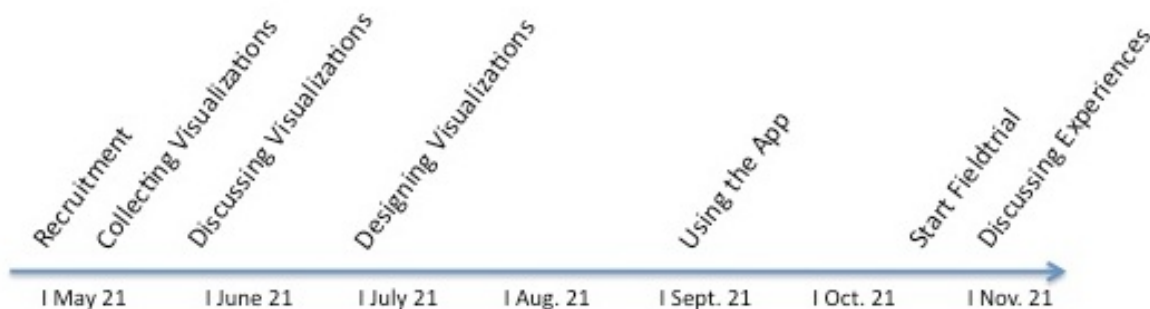
We created information letters explaining the project’s aims and the conditions of participation (modes of involvement, voluntariness, data handling, whom to contact, ...) accompanied by an informed consent form (see Annex 5.1).

In Austria, most participants were either recruited via known contacts from partner JOAFG or social workers at one of Vienna’s neighbourhood centres operated by the “Wiener Hilfswerk”<sup>5</sup>. The Dutch participants were recruited amongst members of the ABC Foundation, a voluntary organisation for and by people with limited literacy. All three organizations recruited participants based on the inclusion criteria defined above. Table 1 presents an overview of the participants taking part in the project’s Co-design activities in both countries.

**Table 1: Overview of recruited participants**

	<b>Austria</b>	<b>The Netherlands</b>	<b>Total</b>
Number	11	11	22
Gender	7 f / 4 m	6 f / 5m	13 f / 9 m
Average Age	74	69	71,5

Our participation strategy involved personal photo explorations, iterative Co-design sessions, and testing sessions. The outcomes (design recommendations for visualisations of eHealth data) and lessons learnt for how to engage people with low literacy in Co-design activities were integrated in the CO-DESIGN and TEST sections of the toolkit. Figure 3 presents a timeline of the Co-design activities conducted within the Got-IT project.



**Figure 3: Timeline of the project's Co-design activities**

<sup>5</sup> <https://nachbarschaftszentren.at/>



## 2.1 PHOTOVOICE SESSIONS

As a starting point, we wanted to find out more about how people representing our target group perceive (graphical) visualisations of health-related data in their everyday lives. Therefore, we facilitated first co-design activities where the newly recruited co-design team members collected visualisations in their everyday lives to later present them to others and reflect on them together. The reflections mirror the pre-conceptions, needs and preferences of the target population concerning visualisation of data. Out of these, we distilled a list of recommendations (see Table 8).

An overview of these first two sessions (i.e., collecting visualisations and discussing these) is presented in Table 2. They are also described in more detail in the following sub-sections.

**Table 2: Overview of session 1 and 2 in both countries**

		NL	AT
Session 1 Collecting Visualisations	Date / Duration	April-May 2021; 1 hour sessions	May 2021
	Participants	o 10 (5 female, 5 male)	o 10 (6 female, 4 male)
	Procedure	o Exploring experiences and home assignment photovoice	o Task instruction and project information via phone and e-mail
	Format	Virtual, Whereby	E-mail and phone
Session 2 Discussing Visualisations	Date / Duration	May 2021	May 2021 / 2 x 1,5 h
	Participants	o 10 divided in 2 groups, o 1 individual participant	o 8 divided in 2 groups o 1 person separately via e-mail <i>o Remark: 10th participant could not take part as she did not want to do a Covid rapid-test</i>
	Procedure	o <u>Discussions:</u> o Dealing with health information o Devices used o Photos and visualisations	o <u>Discussions:</u> o Dealing with health information o Devices used o Photos and visualisations
	Format	Online (Whereby)	Face-to-face

### 2.1.1 SESSION 1 – COLLECTING VISUALISATIONS

#### *Preparations*

In both countries (NL and AT), we recruited co-design teams (N=10/country) of people with low eHealth literacy according to the inclusion criteria described above. An overview of the participants can be found in Table 1. In Austria, we also prepared a document with instructions including sample visualisations to be sent to the participants via email (see Appendix 5.2.1).

#### *Setting*

##### AT

The participants were invited to participate in collecting visualisations of health data. As it was not allowed to meet in person because of the COVID restrictions in place during that time and the lack of experience using video conference tools by the recruited participants, the participants were instructed via email and telephone to collect visualisations and graphical representations of health data they either found hard to understand or liked a lot. They did this for one week.

NL

All participants were recruited via ABC Foundation (Stichting ABC<sup>6</sup>), a Dutch volunteer organization representing people with low literacy. Due to COVID restrictions, photovoice instructions were given in an online meeting (using a paid Pharos Whereby account).

### *Procedure*

AT

Ten participants were instructed to take pictures of visualisations of dynamic data (e.g., daily blood pressure measurements or graphs in newspapers/magazines) they liked or disliked or that they find particularly understandable or difficult to understand in their day-to-day lives. To illustrate the task, we had a smartwatch showing data and a graph on the instruction document (see Annex 5.1.1), emphasizing this could serve as inspiration. The task was carried out individually by the participants. They were asked to collect no more than 5 pictures and send them to the researchers via e-mail. In case of any questions, the participants were invited to contact the researchers to clarify questions or issues. The procedure was also a preparation for Session 2 - Discussing Visualisations (to be described in the next section).

NL

In the online session, participants were instructed to collect visualisations of data individually by taking screenshots or pictures. They were allowed to use examples from different sources, such as apps, Google search, newspapers, television, magazines, websites and wearables. Participants looked for both clear and easy to understand examples as well as difficult to understand visualisation examples. In case of any questions, participants were able to reach out to the researchers via phone or e-mail.

Some participants had very little experience with data visualisations. To give a little bit of context to the participants, visualisations of the Activity Coach app were shown and discussed. Each participant shared their own experience with data visualisations and how familiar they were with eHealth tools.

## 2.1.2 SESSION 2 – DISCUSSING VISUALISATIONS

### *Preparations*

As a preparation for this session, the participants collected visualisations for a duration of one week (as part of Session 1, described above). These were either printed out by the researchers to be discussed together around a table or brought along by the participants to the session (e.g. newspaper snippets or in case they did not know how to send them via e-mail, they presented them on their smart phones). The researchers prepared questions to ask the participants related to the visualisations collected and what they particularly liked/disliked about data visualisations in general and specifically related to the collected pictures. We also prepared screen designs of the Activity Coach app that we printed out to discuss with the participants in the session. We also prepared information sheets and consent forms which we asked the participants to sign at the session. To thank the participants for their time and input and to make the atmosphere friendlier, we also prepared food (such as fruits and small pieces of pastry) and drinks (such as coffee and water) to offer the participants during the session.

### *Setting*

AT

The researchers in Vienna conducted two co-design sessions with eight (out of ten recruited) participants (four per group). Unfortunately, one further participant had to be asked to leave as she

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<sup>6</sup> <https://a-b-c.nu/> [Online; last accessed: 1 Dec 2021]

was not able to present either a valid test certificate or proof of vaccination and refused to do a rapid COVID-test onsite. Another one could not attend and was asked for feedback on visualisations via e-mail.

The session in Vienna took place in a community room at a neighbourhood centre (i.e., a facility with care workers and volunteers who offer support and information in any part of daily living and community life) in the 22nd district of Vienna. Because of the COVID restrictions present at the time of our session, we conducted two workshops with four participants each (i.e., instead of one workshop with all eight participants). The participants and researchers were asked to follow hygiene rules associated with COVID, such as showing a negative test result or a proof of vaccination and maintain physical distancing during the session.

The session was audio recorded and pictures of the creative process have been taken.

NL

The second session was organized online due to COVID restrictions (using a paid Pharos Whereby account). The group of ten participants were divided over three online group sessions.

### *Procedure*

AT

We started with talking about the visualisations collected by the participants and further discussed the first draft of the Activity Coach app visualisations developed by the project partners at RRD. The aim of the discussion was also to reflect on pre-conceptions, needs and preferences of the target population concerning visualisations of eHealth data. In particular, we discussed dealing with health information, devices used, and photo visualisations. The workshops lasted 1.5 hours each (i.e., 3 hours in total). By analysing the hand-written notes and audio files recorded during the session, the researchers extracted a list of the outcomes of the workshop along with implications for design in a summary (see Table 5).

NL

Similar to the sessions in Vienna, the three group sessions in the Netherlands were used to discuss all of the collected visualisations with the aim to reflect on pre-conceptions, needs and preferences of the target group concerning visualisations of data within eHealth tools. Participants were asked to look for 1 to 5 examples of easy and difficult to interpret visualisations. Each visualisation was discussed within the group. Next to the visualisations collected by the participants, the groups also discussed a couple of other visualisation examples (screenshots from the Activity Coach and a step count app).

## 2.1.3 LESSONS LEARNED

### *Visualisation of eHealth data*

Summarizing the results of the workshops, several aspects need to be considered in eHealth visualisations. These are illustrated in **Fehler! Verweisquelle konnte nicht gefunden werden.**, where a range of issues were found in both contexts, i.e., in the Netherlands (NL) and in Austria (AT).

### *Co-design Process*

Asking participants to collect visualisations worked fine. The spectrum of returned visualisations was very broad though – from ads or newspaper articles that included visualisations over personal pictures of health devices to activity graphs in fitness apps (for examples, see Figure 4).

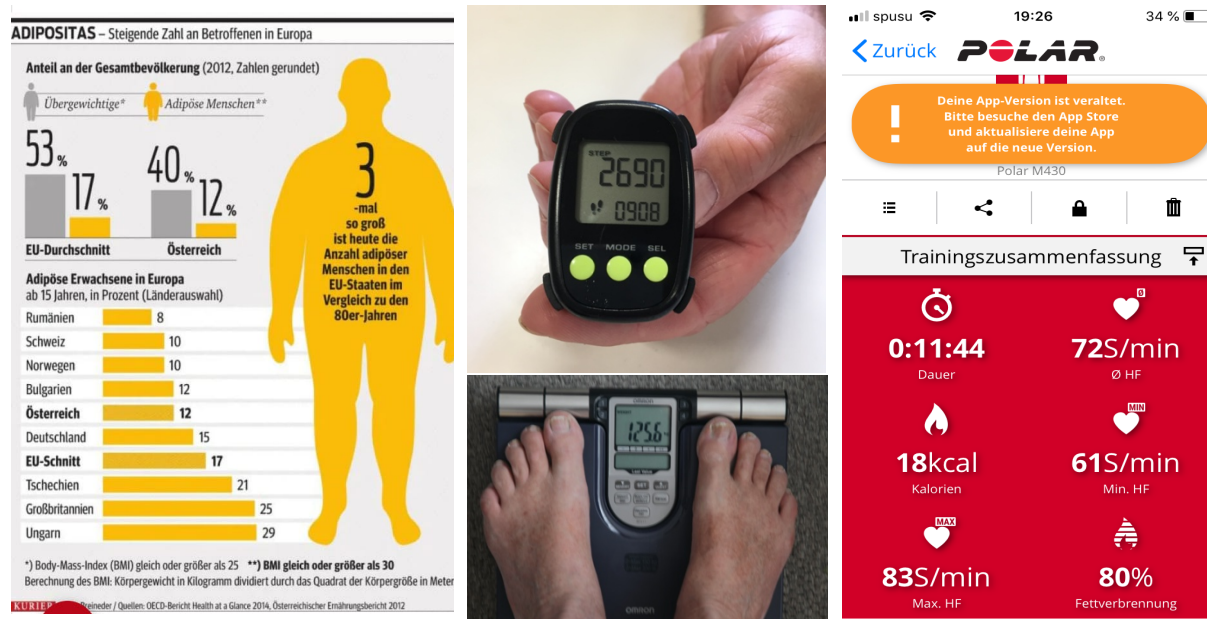


Figure 4: Sample images of visualisations of health data collected by the Co-design teams

A positive aspect of giving some sort of "homework" (i.e., collecting images in advance) was that it allowed those people who could not attend the follow up session in person to make a contribution as well, by sending images and commenting on them via e-mail. The respective participant stated though that she would have preferred to join the discussion with the others to also learn about their perspectives.

In the discussions on-site, it also showed that the participant recruitment worked out appropriately for the purpose of the project, as all of them were interested in health aspects and most struggled in one way or the other in using eHealth applications or devices and interpreting data.

## 2.2 DESIGNING VISUALISATIONS

Now that the participants dived deeper into the topic of visualising eHealth data during the activities described in 2.1.2, the focus of our next session was to invite our co-design team to create their own "ideal" visualisations of eHealth data.

An overview of Sessions 3 and 4 (i.e., designing visualisations and using the app in a subsequent session) is presented in Table 3. Fehler! Verweisquelle konnte nicht gefunden werden..

**Table 3: Overview of session 3 and 4 in both countries**

		NL	AT
Session 3 Designing Visualisations	Date / Duration	July 9 2021, 2 hours	July 1 2021, 2 hours
	Participants	o 4 (2 male, 2 female)	o 6 (3 male, 3 female)
	Procedure	<ul style="list-style-type: none"> <li>o Discussing findings earlier sessions in NL and AT</li> <li>o Discussing Redesign Activity Coach visualisations</li> <li>o Interactive part: screen creation in parts</li> </ul>	<ul style="list-style-type: none"> <li>o Discussing findings earlier sessions in NL and AT</li> <li>o Discussing Redesign Activity Coach visualisations</li> <li>o Interactive part: screen creation in 2 groups</li> </ul>
	Format	Face-to-face	Face-to-face
Session 4 Using the App	Date / Duration	September 14 2021, 2 hours	September 16 2021, 1,5 hours
	Participants	4 (all female)	<ul style="list-style-type: none"> <li>o 4 onsite (1 male, 3 female)</li> <li>o 1 extra (female)</li> </ul>
	Procedure	<ul style="list-style-type: none"> <li>o Downloading Activity Coach (prototype) on personal mobile phones</li> <li>o Discussing adapted visualisations</li> </ul>	<ul style="list-style-type: none"> <li>o Presenting results and adapted visualisations Activity Coach</li> <li>o Performing tasks individually on Activity Coach prototype</li> <li>o Discussing interaction and involvement in Co-Design process</li> </ul>
	Format	Face-to-face	Face-to-face

*Preparations*

AT

We prepared a presentation that consisted of a slide with a table of findings distilled from the previous sessions in the Netherlands and in Austria to show to the participants. The table consisted of items with criteria for visualisations based on the previous sessions, and two columns indicating whether these items were found in the Netherlands and/or in Austria (see Table 4). We also printed the table out to hand out to the participants with a column to tick the findings, i.e., indicating which of them they find most relevant. We further prepared A3 sheets of paper with changes of the Activity Coach app screens throughout the co-design process so far. We prepared and printed out a document with a short story explaining a particular situation in their day-to-day life where an eHealth app could be of use to be used by the participants as a trigger for their own visualisations. We also prepared visualisation snippets on pieces of papers, scissors, pens and glues to be used in the active part of the co-design session. As in the previous session, we prepared food (such as fruits and small pieces of pastry) and drinks (such as coffee and water) during the sessions.

NL

As in Austria findings from the previous sessions were presented. They were not handed out on paper. For the active participation part, visualisation snippets on paper, including the latest Activity Coach app visualisations, scissors, pens and glues were collected.

*Setting*

AT

In Austria, we conducted our second co-design session with six participants (three male, three female) face-to-face in a library meeting room at the Technical University of Vienna (TU Wien). An additional participant got sick on the same day and could not participate in the end. Three additional participants (including the one who got sick) participated via email as far as this was possible. According to the COVID rules, we followed the hygiene concept of TU Wien.

The discussion part of the session was audio recorded and pictures of the creative process have been taken.

NL

Five participants were recruited to participate in the second co-design round. One of the participants dropped out due to personal circumstances. In the end, four participants (two male, two female) and a designer from RRD joined the session. The session was organized at the Pharos office in a live setting. Protocols according to the Dutch COVID regulations were followed.

*Procedure*

AT

We first presented the main findings to the participants, which was combined from across NL and AT. After that, the participants were handed out the table summarizing the main findings (see Table 5 showing the identified items and in which countries these issues were raised) and asked to make a tick at each item that they personally find particularly important. The three participants who could not join in person, followed up with this particular task via e-mail (i.e., they were sent the list and asked to tick the items that are most important to them and send these back to the researchers via e-mail). As a next step, the research team presented the new versions of some of the Activity Coach app screen designs in comparison to the old version. Having the screens next to each other, the changes became more obvious. Following the discussion of the new versions of the screen design, the participants were asked to team up in two groups with three people each and start with the more active part of this session. Each group was accompanied by one researcher. We started with a short story to imagine a particular situation in day-to-day life where the app could be used. We then used the Activity Coach (re)designs together with other snippets that we found online to design new screens in two groups. Each of the two groups focused on a different topic, where they could choose between heart rate, steps and sleep, which are the basic features offered by the Activity Coach app. Group 1 chose to create screens for heart rate measurements, group 2 chose to work on a step-counting feature.

**Table 5: List of design recommendations derived from the previous sessions**

	NL	AT	✓
Collection of data, privacy, consent	X	X	
Don't use pop ups and ads	X		
Make pop ups easy to remove if you have to use them	X		
Don't show too much info, as this could be overwhelming	X	X	
Make sure images match with the content	X	X	
Make sure graph visualizations are labelled	X		
Font often too small	X	X	
Good contrast is important	X	X	
Getting familiar too time consuming		X	



Language: easy and native	X	X	
Adaptability (level of detail, set own goals)		X	
Motivate to use / engage with it	X	X	
Avoid scrolling (all information on 1 screen)	X	X	
Highlight important information (e.g. using 'signal colors')	X	X	
Missing measurement points shouldn't cause problems in visual representation		X	
Buttons / interactive elements are too small	X	X	

## NL

The main findings of the previous sessions combined from across both NL and AT were presented to the participants (see Table 5). Participants were asked to reflect on all findings. Based on the findings, visualisations of the Activity Coach app were redesigned. Before and after redesign screenshots were shown. Participants were asked what they liked and disliked about the changes that were made.

Next, the participants were split up into two groups. Each group focused on a specific topic within the Activity Coach app. They could choose between heart rate, steps and sleep. Group 1 chose to create screens for heart rate measurements, group 2 a step-counting feature. All groups had access to large prints of smartphones, in which they could draw their own ideal visualisation. They were also allowed to use printed designs of the latest Activity Coach app visualisations.

### 2.2.1 LESSONS LEARNED

#### *Visualisation of eHealth data*

In general, the participants were interested in following up with the findings from the previous meetings. Furthermore, as found in the second co-design session, the participants validated the findings from the previous meetings. The validation is also illustrated in the "pre"-column in Table 8.

Regarding the design of eHealth visualisations, design implications were derived from the session, as presented in the following bullet points. The letters in brackets refer to the respective screens shown in Figure 5 and Figure 6. These aim to illustrate some of the issues discussed in the sessions. Note, screens A, B and C are screen designs of the AC app that were discussed. Screens D, E and F are screens that were designed by the participants in the sessions. Screens D and E were designed in Austria, screen F was designed in the Netherlands.

- Avoid the presentation of too much information.
- Put the **most important information** (e.g., the visualisation) in the **centre** of the screen and make it **bigger** so it uses up more space and it can be shown bigger (i.e. easier to read) (E)
- Additional option: allow the graphs in a **landscape format** to have **bigger representations**
- Remove **background colours** (for printing) and the **background image** because the tree + person in the background (A, B, C) do not convey anything important and they were perceived rather distracting
- Allow **less data collection points** for measuring the heart rate; show less details; potential for personalization

- Add **icons or other descriptions to the graph labels** so the numbers are clearly understandable (e.g., time, hours) (A, C, F)
- Heart rate: option to show/highlight the **current or latest measurement**
- Optional: add **suggested actions** (e.g., drinking water as an action to lower the heart rate) to the measurements (D)
- Sleep: highlight the **actual sleeping time** with a grey background and **remove the black background** completely (A)
- Use **colours (signal colours)** with caution, especially when there are feelings/meanings assigned to them. **Red only if there is danger; green when you want to stress that something is good, safe or positive.** (C, F)
- While most of the German words were used and translated correctly, some of the German **words need to be corrected** (e.g. upper case instead of lower case)
- Use **clear, easy to understand wording**: The word “sleep stages” appeared to be confusing, so the participants recommended just using the word sleep.
- Design **graphs** in a way that is **easier** to understand
- **Overview page**: optionally use the colour as a background frame (instead of the image with the tree)
- Overview page: reconsider the **overview icons** next to the text, e.g., do not use half circles because they were not perceived understandable (B) – rather a full circle showing how far you are to reaching your goal as it is shown in the outcomes of group 2 (E)
- Optionally, add a **longer-term visualisation** (i.e., on top of day and week, add a month/X months/year... representation)
- Add the possibility to let the information be read out aloud (F)



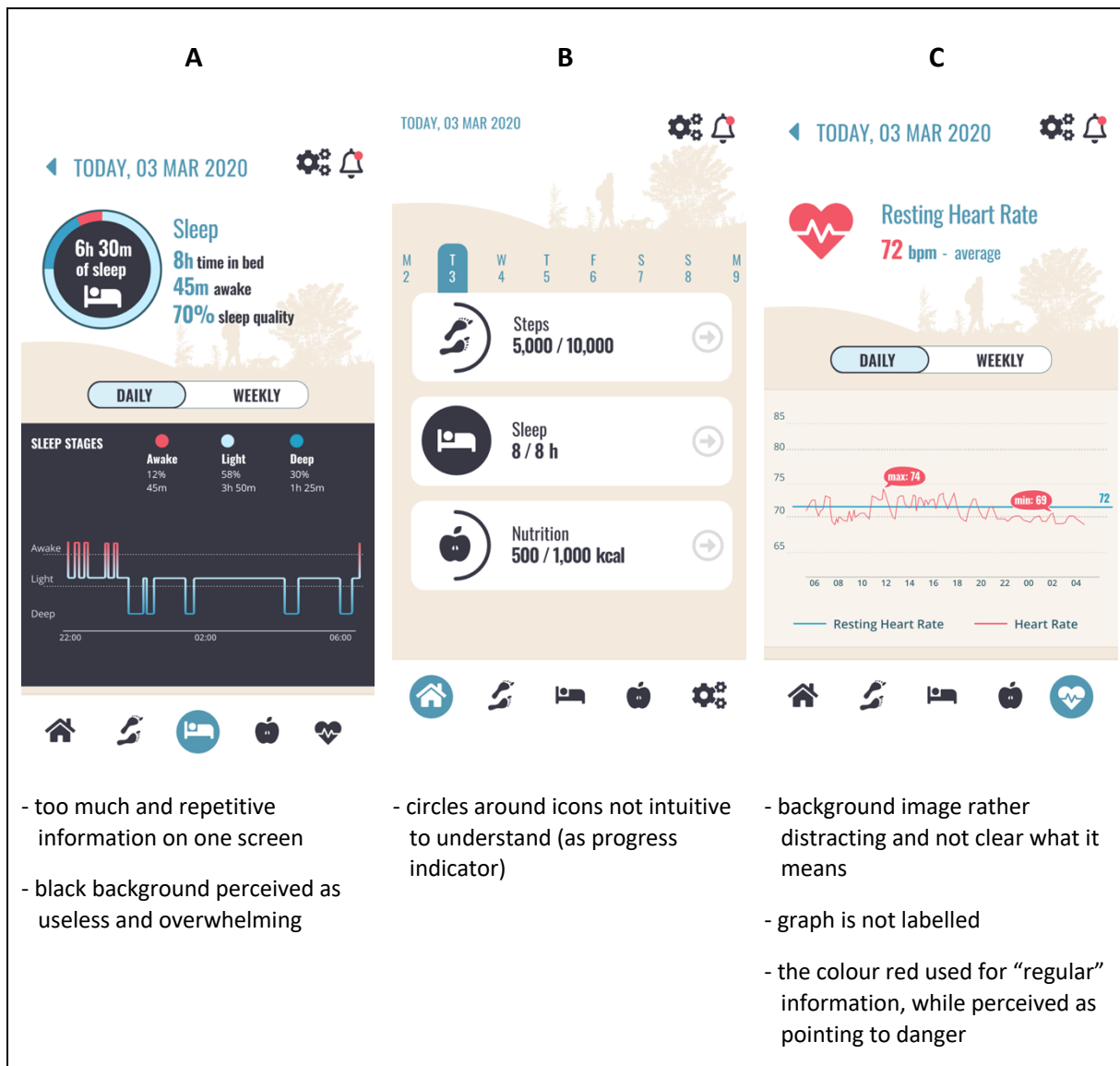


Figure 5: Issues raised in the Activity Coach screens

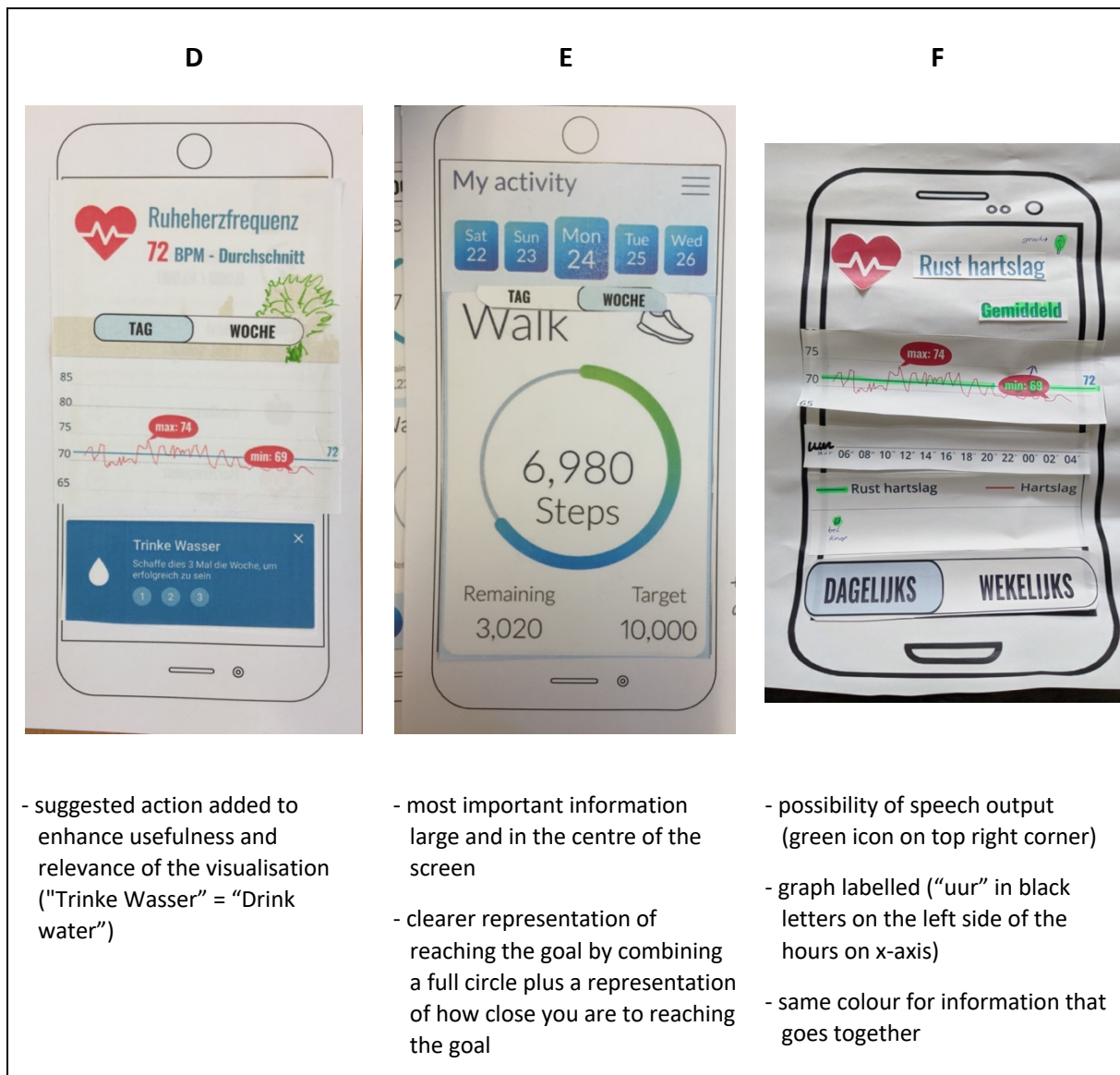


Figure 6: Screen Designs by participants as results of the Co-design activity

### Co-design process

The co-design process went smoothly in both countries. Participants were eager to share their views. They did not restrict their comments to the visualisations, but also gave tips to improve the (safe) use of eHealth apps, such as an option to set personal goals, the use of an audio (read aloud) function, an emergency button in case of medical heart rate issues. The participants enjoyed discussing the earlier findings. The hands-on part was appreciated. At first, they were a bit confused and insecure about what to do, but soon they divided tasks between themselves and seemed to enjoy themselves altering existing and creating new visualisations. They did not show any hesitancy in asking questions.

## 2.3 USING THE APP (CLICKABLE PROTOTYPE)

The design recommendations derived from the previous activities have been used to adapt the Activity Coach app screen designs made by RRD accordingly, and turn them into a clickable prototype. The main aim of the Co-design sessions described below was to get feedback on the interaction within eHealth applications.

### *Preparations*

A major preparation included the design and implementation of a clickable prototype in close collaboration with a designer from RRD. This included discussions via comments in an online tool, via email and personally in online meetings between the project partners.

In Austria, we also prepared slides to show the participants results from the last sessions (from both AT and the NL) and to ask for feedback on the co-creation process itself (see ANNEX 5.4.1). Furthermore, we prepared tasks to be conducted by the participants using the clickable prototype to see if they were able to navigate and interact with the prototype and find out where possible hurdles occur. (see Table 6)

We also used recorders and cameras to audio-record the session and to take pictures.

The preparations in the Netherlands were similar. We prepared slides to show the participants results from the last sessions (from both AT and the NL), an instruction to download the prototype and some navigation tasks, to see how they were interacting with the prototype.

As in the previous sessions, we prepared food (such as fruits and pieces of pastry) and drinks (such as coffee and water) to offer the participants during the sessions.

### *Setting*

#### AT

As the chosen date for this co-design session did not fit with the schedules of many former participants, a mixed approach for conducting the evaluation of the first clickable prototype was chosen. There was one session with a single person only and another in a group setting.

#### **One-on-One Session**

One TUW researcher met with a participant in a park close to where the participant lived. As the participant did not possess a smart phone, she was provided with one from TUW for the session (the participant was used to the concept of using apps by her tablet, though). No audio recordings were taken due to the surrounding noise, only handwritten notes were taken.

#### **Group Session**

For the group session we invited the participants to TU Wien where we were working together in the library meeting room. The university undertook 3G-checks for everyone entering the building as by that time this was a requirement in the local COVID rules. The participants brought a smart phone each and we used audio recorders that we placed on the desks to record the session. We divided the participants two-by-two on two desks, so one to two researchers could work together with them on a table each.

#### NL

This session was organised live in Utrecht, with reference to COVID restrictions at the time (keeping 1,5 m distance). The participants brought a smart phone each and we used audio recorders that we placed on the desks to record the session. The participants stayed at their personal desk, except the married couple, who shared their desks. The two researchers continuously helped the participants in their tasks.

*Procedure*

AT

**One-on-One Session**

As the participant did not take part in the previous session as well, the researcher presented the results from the last two sessions and asked for comments on those results. Then they went through the tasks on the clickable prototype together (the participant trying to find the answers and the researcher observing and giving hints, in case the participant got stuck) and talked about difficulties that occurred. The list of tasks can be found in Table 6, the corresponding observation sheet in **Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.** The session was concluded with a discussion of motivational aspects of performing physical activities.

**Group Session**

Four participants joined the session (three female, one male), and there were three researchers present. The session lasted 1.5 hours in total. After a greeting and introduction, we presented the findings and visualisations created from the last meetings in the NL and in AT. We then started the interactive part. The participants were asked to type in a link (that we projected on our slideshow) on their phone in a browser to see the clickable prototype of the Activity Coach app. Once the prototype was downloaded, they were asked to conduct a series of tasks on their own (the same as within the one-on-one session) while the researchers present were observing them.

**Table 6: Tasks participants were asked to conduct on the clickable prototype**

TASK	ANSWER
STEPS	
How many steps have you taken between 17:00-18:00?	
How many steps did you take in total on Thursday?	
SLEEP	
What was your sleep phase at 1:55?	
What can you tell about your sleep on Thursday?	
HEART RATE	
What can you tell about your heart rate on Wednesday?	
What is your average heart rate today?	
What is your current heart rate?	

After everyone completed the tasks, we discussed how the participants liked interacting with the prototype, what they found easy or difficult, and any other concerns. After this interactive part, we followed with a discussion on the co-design process as such from the first contact at recruitment up to that day and concluded the session with an outlook on the next steps and asking who would like to

join the field trials in October including a check whether their phones met the requirements of the Activity Coach app. Given the Activity Coach app is paired with a Fitbit wristband which requires the respective Fitbit app installed on the smartphone as well, we also checked whether their phones met the requirements of the Fitbit app<sup>7</sup>.

NL

Four participants joined this live session in Utrecht. Earlier co-design steps and findings were briefly discussed. The participants typed the link to the clickable prototype on their smartphones and proceeded to explore the available functions. The above questions loosely guided them in doing so. The two researchers observed the proceedings and assisted the participants when they were stuck in using the app. At the end they were asked who would like to participate in the testing week. They all showed interest.

### 2.3.1 LESSONS LEARNED

#### *Visualisation of eHealth data*

AT

When showing the changes in the visualisations based on their comments from the previous session, the participants immediately were happy that the background image (and dark colour at the sleep screens) was changed. Furthermore, they liked the better contrast and changes in the symbols, especially the walking person instead of the two feet representing the step counting feature. See screens in Figure 11: Course of the screen design changes during the co-design process.

Nearly all participants were able to complete all tasks. Only one person really struggled when being asked to find out a value for a certain day of the week for the 1<sup>st</sup> two categories (steps and sleep), but then made it on her own for the last one. *“It needs a bit of time until everything is clear. You have to think a lot during the first time, but if you do it more often, it is ok.”* (participant of the one-on-one session after finally managing to do the task on her own). The eHealth data itself was in general understandable. Sometimes they had to recheck, if it was asked for the actual, average or resting heart rate to not write down the wrong one as on some screens all of these different heartrate values could be seen simultaneously. See Figure 7.

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<sup>7</sup> [https://play.google.com/store/apps/details?id=com.fitbit.FitbitMobile&hl=en\\_US&gl=US](https://play.google.com/store/apps/details?id=com.fitbit.FitbitMobile&hl=en_US&gl=US) [Online; last accessed Dec 2, 2021]

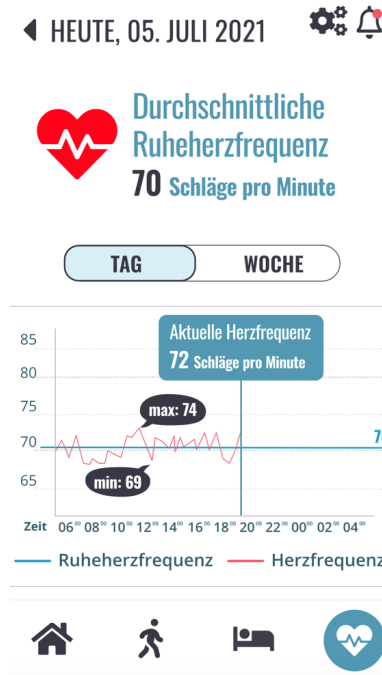


Figure 7: Screen showing different kinds of heart rate values simultaneously

Their feedback also made it clear that even “quick” mock-ups need to be precise. One participant was wondering about the colour of the bar showing the steps for Tuesday (“DI”). She expected it to be greenish coloured as well as it reaches up to the 10000 steps line. From the graph itself, it also was not easily visible where the target was set. So, this needs to be highlighted more clearly. (See Figure 8)



Figure 8: Seems like number of steps reaches goal on Tuesday, but respective bar is still blue

Some numbers were not understandable at first (e.g., 5000/10000 when showing the summary of completed steps) and at some points the terminology was not clear for two participants (i.e., what does "Ruheherzfrequenz", resting heart rate, mean?).

Some participants had difficulties in finding out what was actually clickable (e.g., graphs) to see more details. One person had troubles with tapping on the screen. Finding the right time (day/week/...) was not always perceived as intuitive, but the participants were able to familiarize themselves after a while. Some participants tried to zoom in to enlarge details, but the zooming was not always working well, which may be due to the prototype rather than using the app. Another participant was not happy with being able to navigate to a feature in two different ways (i.e., starting from the main menu and from within the feature). Several participants were interpreting numbers by looking at the height of the bars in the visualisations rather than tapping on them to get a description of the details. The many tight lines and hours labelling seemed to be confusing and strenuous for the participants as well. It was not possible to find out about this in that limited prototype where not every bar was clickable, but as the bars are placed so closely together, we anticipate it might be difficult to tap exactly on the desired bar, and not its neighbours. (see Figure 9)



Figure 9: Representation of steps per hour was overwhelming

NL

The visualisations led to further discussions on clarity and usability. Some participants found they did not know where to tap to find information or to take the next step. Reading the graphs was often difficult. What are the bars and how can you tell how many steps have been taken? Setting daily target was confusing. Colours should be adapted so as to raise the contrast between targets set and actually met (see Figure 8 showing bars in quite similar colours). The concept of resting heart rate was not clear. Here the meaning of the blue line was not clear. The participants stated that to them red means danger, so all heart information in red was seen as an alert: danger: this is not safe, whereas this was not the meaning of the visualisation. (See Figure 7)



*Motivational Aspects*

As already discussed in previous sessions, it was agreed that there has to be a kind of motivation to use such systems. One participant said that she doesn't like taking medicine and since she's taking a ride on the ergobike every morning, she could get rid of one of her five daily pills. She even tracks the parameters of each ride in her own training report (see Figure 10). When being asked about empty rows in her report (remark: she showed more reports around than the one depicted), she answered that "If I don't do it in the morning, it is very likely that I don't do it that day." Thus, always doing something at the same time of the day helps turning it into a routine, which can be important for the use of eHealth apps as well.

Dat	Min	Zeit	KM	Kal	Puls	Uhr	bis	über	Puls
							135/85	135/85	
1	4:11	12:27	12:27	12:27	-	11:15	111/152	FR	62
2	2:42	10:22	11:20	11:20	75	11:15	118/152	~	17
3	2:40	10:22	11:20	11:20	75	11:15	118/152	~	17
4	2:42:4	10:22	11:20	11:20	75	11:15	118/152	~	17
5	2:6:0	10:1	11:1	11:1	75	11:15	118/152	~	17
6	2:0:2	10:1	11:1	11:1	75	11:15	118/152	~	17
7	2:3:10	10:1	11:1	11:1	75	11:15	118/152	~	17
8	2:3:14	10:2	11:2	11:2	75	11:15	118/152	~	17
9	2:3:50	10:2	11:2	11:2	75	11:15	118/152	~	17
10	2:2:07	10:1	11:1	11:1	75	11:15	118/152	~	17
11	2:6:0	10:2	11:2	11:2	75	11:15	118/152	~	17
12	2:3:28	10:4	11:5	11:5	75	11:15	118/152	~	17
13	2:3:01	10:6	11:5	11:5	75	11:15	118/152	~	17
14	2:1:54	10:1	11:1	11:1	75	11:15	118/152	~	17
15	2:2:55	10:3	11:3	11:3	75	11:15	118/152	~	17
16	2:2:34	10:4	11:5	11:5	75	11:15	118/152	~	17
17	2:0:35	10:1	11:1	11:1	75	11:15	118/152	~	17
18	2:4:09	10:6	11:5	11:5	75	11:15	118/152	~	17
19	2:4:34	10:8	11:6	11:6	75	11:15	118/152	~	17
20	2:4:20	10:5	11:5	11:5	75	11:15	118/152	~	17
21	2:4:15	10:6	11:5	11:5	75	11:15	118/152	~	17
22	2:3:08	10:0	11:3	11:3	75	11:15	118/152	~	17
23	2:3:40	10:1	11:6	11:6	75	11:15	118/152	~	17
24	2:3:42	10:3	11:6	11:6	75	11:15	118/152	~	17
25	2:3:27	10:4	11:5	11:5	75	11:15	118/152	~	17
26	2:4:09	10:6	11:9	11:9	75	11:15	118/152	~	17
27	2:4:12	10:7	11:5	11:5	75	11:15	118/152	~	17
28	2:3:12	10:5	10:8	10:8	75	11:15	118/152	~	17
29	2:4:08	10:5	10:8	10:8	75	11:15	118/152	~	17
30	2:3:24	10:4	11:5	11:5	75	11:15	118/152	~	17
31	2:3:40	10:5	11:15	11:15	100	11:15	118/152	~	17

Figure 10: Daily training report of one participant

It was stated that performing physical activities together with other people might be motivating as well (an aspect that we also encountered in previous research projects), but added that it is not easy to find those training partners.

NL

Participants were eager to share their views and not easily put off. It seems that they have learned to be creative and persistent in daily life, when information is not custom made and poorly understood. "You really have to take an in depth look and take your time." They have a more encompassing view than just the visualisations themselves. E.g they recommended the use of multi lingual apps, as the app was also important for people with a migration background.



## *Co-design Process*

### AT

Overall, the participants stated they were motivated to engage in the process and they would be interested in being involved in the future. The named motivations to engage included learning, interest in medical topics or ageing and technology. They were concerned about the distinction of older and younger people in society and accessibility issues that come with these distinctions (and often discrimination). Taking part in research projects can be a way of making digital tools more accessible also for people with low eHealth literacy. The process itself was rated positively, however, there was also a recommendation to really make sure to (proactively) include everyone especially in the first session(s) where people are not yet familiar with each other. Participants who are eager to talk more may not need as much moderation to contribute to a group, while more introvert participants may need more moderation to be involved. The participants were also motivated to contribute to the development, and they were curious to see that similar issues were faced in another country (i.e., the Netherlands).

### NL

Participants differ in the ease with which they can use the app. Overall, they accept their differences and try to help each other. However, some tension arose when a participant with a migration background repeatedly stressed the point of multilingual apps/information. All participants are motivated to contribute and tend to take a broader view in the co-design process than the researchers. They do not limit their comments to the visualisations: They feel that everybody should be able to use the app, therefore it should be available in several languages. They also have a keen eye on safety, e.g., what if a heart patient should not do 10.000 steps if that is too dangerous? How can the app pick this up? Also: Can the app be used in combination with a pacemaker? These comments, questions and suggestions illustrate the personal concern and responsibility for good visualisations for future app users such as they themselves. As a result, the Co-design process was at times more elaborate than the researchers had expected. However, it also resulted in surprising and useful findings.

## 2.4 FIELD TRIAL

The field trial and the accompanying activities mark the final part of the Co-design process within the Got-IT project. A high-fidelity prototype of RRD's Activity Coach app was created based on the findings and the mock-ups developed in T1.2. This functional prototype was evaluated with target users (N=5-6/country) in real-life during one week with the goal to update the list of recommendations initiated in T1.2 for the CO-DESIGN section of the toolkit accordingly. Table 7 gives an overview about the field trials in both countries, including the set-up sessions and the sessions to discuss the usage of the app(s).

**Table 7: Overview of the field trials in both countries**

		NL	AT
Setting up the Devices	Date / Duration	October 19 2021, 165 minutes	October 19, 20, 21, 28 2021, 1-2 hours
	Participants	<ul style="list-style-type: none"> <li>○ 5 (2 female, 3 male)</li> <li>○ (1 man was instructed individually)</li> </ul>	<ul style="list-style-type: none"> <li>○ 3 (female) in a group,</li> <li>○ 3 individual (1 male, 2 female)</li> </ul>
	Procedure	<ul style="list-style-type: none"> <li>○ Setting up the accounts, apps and pair the devices with the participants</li> <li>○ Explore the devices and apps, clarify questions</li> </ul>	<ul style="list-style-type: none"> <li>○ Setting up the accounts, apps and pair the devices with the participants</li> <li>○ Explore the devices and apps, clarify questions</li> </ul>
	Format	Face-to-face	Face-to-face
Discussing the Usage	Date / Duration	October 2021, 1.5 hours	November 2, 5 2021, 1-1.5 hours
	Participants	<ul style="list-style-type: none"> <li>○ 5 (2 female, 3 male)</li> </ul>	<ul style="list-style-type: none"> <li>○ 5 (4 male, 1 female) in group,</li> <li>○ 1 (female) individual</li> </ul>
	Procedure	<ul style="list-style-type: none"> <li>○ General evaluation of experiences</li> <li>○ Discuss individual experiences</li> <li>○ Discussing the feedback</li> <li>○ Collect devices and give the Fitbit watches to the participants as a gift</li> </ul>	<ul style="list-style-type: none"> <li>○ Collecting feedback on post-its and posting them on a whiteboard</li> <li>○ Discussing the feedback</li> <li>○ Collect devices and give the Fitbit watches to the participants as a gift</li> </ul>
	Format	Face-to-face	Face-to-face

### 2.4.1 SETTING UP THE DEVICES

We organized meetings with participants to hand over and explain the devices to them and to set up the apps to start the field trial.

#### *Preparations*

##### AT

We prepared six Fitbit watches, a short manual of usage for each participant, and chargers (as the Fitbit watches come without chargers). For collecting data on the usage, we also prepared a short diary in A5 landscape format (see Annex 5.4) for the participants to fill out for a week. Furthermore, we had consent forms prepared for the participants to sign. Additionally, we set up e-mail addresses and Fitbit accounts for each participant in order to ensure a smoother set up process.

As the Fitbit app needs Android version 8 or newer, it was checked in the previous meeting, if the participants' phones meet that criterion (otherwise they had to be excluded from taking part in the field trial) or remotely during a phone call in the recruiting phase of the field trial.

As in the previous sessions, we also prepared food (such as fruits and small pieces of pastry) and drinks (such as coffee and water) to offer the participants during the session.

##### NL

Five Fitbit watches were charged. Otherwise, they were not prepared. Consent forms were prepared and a short paper and pencil diary/log for every day of the testing week (see Annex 5.5.2). They could make any comments and answer two questions: What did you think of using the activity coach app today? Was there something unpleasant or nice when you used the app today?

### *Setting*

AT

Initially it was planned to conduct one set-up session with all participants at the HCI group's premises. As the development of the prototype took longer than initially planned, that meeting had to be delayed on short notice, which resulted in splitting the meeting into one group meeting and three individual meetings. Three participants joined at a group meeting (three female). Three additional participants (two female, one male) met with a researcher individually at TU Wien or in the neighbourhood of the participant. Before the start of the meeting, the participants were checked according to the COVID rules in place at the entrance door.

NL

One female participant had to cancel the meeting the day before the live session due to a COVID infection. We found a male replacement, who received an individual instruction, as he could not attend the live group meeting.

The group meeting had to be delayed for a week since the prototype was still being developed, which was awkward for the participants, as they had already organised transport and a day off at work. Two women and two men joined the re-scheduled group session. In addition to the two researchers, one Pharos technician was present to assist us with the technical installations. One of the male participants was joined by a female friend, who could help him with any installation problems. She was not considered a formal participant.

### *Procedure*

AT

After welcoming and asking the participants to sign consent forms, we introduced and demonstrated the Fitbit watches and apps to be used. The participants could choose a watch of their preferred colour to use for the duration of the field trial. We installed the Fitbit app and the Activity Coach app on the phones of the participants. One participant borrowed a phone for the field trial for compatibility reasons, and if needed, participants were also loaned chargers. We created accounts for the participants and logged into the Fitbit app and the Activity Coach app which we also paired with each other and with the watch. The participants had some time to explore the watch and apps, and we showed them how to synchronize the watch with the app(s) and answered any questions they had at the time. Furthermore, we handed out the diaries to the participants and asked them to fill these out for the duration of a week.

NL

The participants were welcomed and informed consent forms were signed. Then the Fitbit app was installed on the participants' smart phones and a Fitbit account was made. Subsequently the Activity Coach app was installed and the Fitbit was linked to the Activity Coach. We subsequently explained the task for the testing week and answered any questions.

### *Lessons Learned / Issues that occurred*

AT

The set-up issues in the group session and in the three single sessions are summarized below.

- Time: In some cases, the installation and set-up process took much longer than expected (some more details on the causes for that circumstance below) and some participants were already quite annoyed that everything took so long. „I envy you that you are so patient. I would have already given up long time ago.“

- Memory space: Occasionally we needed to delete some apps from the phone to get some space for the two new apps. Although the respective participants confirmed that it doesn't matter to them as they never used those apps, we did not really feel comfortable having to take this measure
- Pairing confusions: Pairing the devices did not work smoothly in the group setting – the work-around was to pair them one by one and 'hide' the currently unused wristbands in another room so that the app knows which one to choose.
- Aesthetics: Side remark: we offered three wristband options: pink, white and black – the ladies chose either pink or white.
- Preparation advantages: It was good that we prepared the accounts, as the login process went quickly and smoothly.
- Some app-specific issues that occurred:
  - Fitbit-App:
    - One case: Installation took a very long time and then it wanted us to create a Samsung account, which we did not want to, so the app was deinstalled and reinstalled again. Login with prepared credentials went fine then.
    - We could not find the Fitbit App on one person's phone. It turned out that she only had Android version 5. She offered to ask her son, if he could organise a newer phone for her. We decided to provide her with a loan phone to not cause too many troubles for her.
    - Problems connecting with the data of the wristband (showed right values initially, but did not synch later on); pairing it as a new device then later worked when we gave it another try
    - Fitbit assumes that everybody owns a charger for the charging cable they enclose in the package. But here (and in Session 4) it turned out, that many people don't. So we had to organise a charger for those people as well.
  - Activity Coach App:
    - Participants were a bit disappointed that the Activity Coach only offered the step counting feature and not also the sleep and heartrate features that they had commented on in earlier versions
    - One case: Clicked on 'install' several times, but nothing happened (also no feedback as to why it did not work) -> It turned out that there was not enough space on the phone, but we did not get any feedback pointing to this as the issue
    - One case: we were not able to retrieve the Fitbit data for a couple of times -> we then reconnected the wristband again in the Fitbit App -> it still said that there was no data and started the process again. -> we then clicked on the settings icon and paired the device 'manually' from there. From then on it worked

In general, even though the project team tried to prepare as many things as possible (setting up credentials for the participants, charging the devices, preparing chargers, in case people didn't have their own, ...), there were some issues in all of the sessions that led to a delay in the process and raised the question, *"what would have happened / what would the participants have done, if those issues occurred when they are doing this process on their own without the support of the project team / other more tech-savvy people?"* (participant of an individual meeting)

NL

- Installing the apps and creating accounts proved difficult for the participants, even with the help of the two researchers and the technician. Pre-installment would have been helpful.
- Limited IT literacy made several steps difficult:

- using the Pharos Wi-Fi;
- finding the app store,
- finding the apps in the app store,
- downloading the apps,
- finding a correct password,
- updating apps,
- linking the apps.
- Participants were reluctant to agree with Privacy agreements, without really understanding them.
- Participants showed remarkable patience and endurance, as the meeting lasted twice as long as planned.

The lessons learned are that more elaborate preparations are required for this step. Furthermore, we learned that remaining patient and not hiding our own frustration and incompetence was crucial, as were our apologies to the participants.

#### 2.4.2 Discussing the Usage

After a week of usage, we organized a meeting to discuss the participants' experiences to gather relevant insights on the usage and on the entire co-design process for the toolkit.

##### *Preparations*

AT

In the library meeting room at TU Wien where the meeting took place, we prepared tables with post-its, pens and empty whiteboards to be used for the feedback session. We also had audio recorders ready, and we printed out the list of criteria for the visualisations as developed throughout previous sessions. We also prepared a slideshow to illustrate the previous Co-design sessions and activities to the participants for a discussion, and a voting sheet with all the Co-design sessions (see Annex 5.4).

NL

The live meeting took place at Pharos, meeting the COVID requirements. The meeting was audio recorded.

##### *Setting*

AT

Five participants (four female, one male) joined for the session, which was conducted at the HCI library meeting room at TU Wien. The participants were checked according to the COVID rules in place at the entrance door and spread on three groups of tables. One additional participant (female) met with a researcher separately at their home.

NL

Three male and one female participant were present at the live evaluation session. As before, one male participant was accompanied by a female friend. This time, only one researcher was present as the other was on sick leave.

##### *Procedure*

AT

**Group setting:** To gather insights about the usage of the devices and apps with respect to the visualisations and about the Co-design process, we divided the meeting in two parts. After welcoming the participants, we started off with collecting feedback about the field trial. Participants were asked to write positive and negative feedback about their experiences with using the app(s) and the

wristband, and other comments on post-its individually. These were posted on the whiteboard by the participants or researchers and we subsequently discussed them within the entire group. Subsequently the participants were asked to mark the most important issues on the list of design criteria derived from the first Co-design meetings to see, if their preferences changed after actually getting some hands-on experience with fitness apps (see Table 8).

After discussing the feedback of the participants posted on the whiteboard and their experience in more detail, we started with the second part of the meeting. We used the slideshow (see ANNEX 5.4.2) that we had prepared to illustrate and review the previous co-design sessions and activities before asking for feedback about what they liked or disliked about the respective activities, and how we could improve our work. After a subsequent discussion, we handed out a voting sheet to the participants and asked them to rate the activities that we had conducted throughout the Co-design process. Finally, we collected the chargers and other devices except for the wristbands, which we gave to the participants as a gift in return for their participation.

The individual feedback session was conducted like an open conversation having a look at the user diary and talking about the issues that occurred together. That participant only took part in the field trial, so she did not take part in the ranking exercises. The charger given to the participant was also collected after the feedback session, and the Fitbit watch was handed over to her.

NL

The participants were welcomed and some time was allowed for informal chit chat. As the group now included the male participant who did not attend the preparatory group session, participants first introduced themselves. Subsequently a brief general impression was asked of the group, which was followed by individual reflections on the participants' experiences. Finally, the researcher summarised the reflections and the group further discussed them. Finally, the participants were asked to share their evaluations of the parts of the Got-IT cocreation sessions that they had participated in. The meeting was then closed with sharing of information on the next steps in the project and a warm thank you. The participants were told that they could keep the Fitbit watch.

#### *Lessons Learned / Feedback on the Field Trial*

AT

The participants discussed several positive aspects about the usage of the apps and the Fitbit wristband (watch). These included:

- the apps were understandable
- the wristband is comfortable to wear
- measurements are appreciated, e.g., of heart rate and sleep index
- it was exciting to see certain movements shown (i.e., cycling was detected on the Fitbit app)
- hourly count of the steps was appreciated (instead of bigger gaps between counts)
- explanation of difficult terms was found in the usage manual as mentioned by 1 participant

The negative aspects regarding the usage included:

- a participant was unable to measure the heart rate because the watch did not work well
- terminology issues on the watch: unclear what "Wassersperre" or "Zonenminimum" mean
- notifications on the watch vanish too fast (e.g., in cases of it not being understandable there is no time to look up the term)
- letters on the watch are too small
- the watch seems to have many functionalities that are not all clear

- on two phones, the Activity Coach app crashed whenever it was opened
- data transfer from the Fitbit app to the Activity Coach app and to the watch was perceived as too complicated, as it requires Bluetooth, internet and location services to be turned on on the phone
- the number of counted steps varied between the Activity Coach app and what was shown on the watch (the watch always showed more steps as there was always some delay in synchronisation)
- the step count goal was not transparent, as it changed over time for unclear reasons
- the Fitbit app is in English by default if not manually changed to German

Other comments included:

- a participant wished for more guidance and practice upfront
- one participant appreciated the measurement of their heart rate, although the information that it is too high was not new to her
- interest and speculations about functionalities and how they worked, e.g., how are steps measured? Are step sizes also measured? How does the Fitbit app know that a person was biking?
- a participant asked whether it is possible to combine a default eHealth app on her phone with the Fitbit app to have fewer apps on her phone

The criteria for visualisations were rated again by the participants. Table 8 shows how the values for some criteria have changed from before to after getting “real life” experience with using the Activity Coach and Fitbit apps (see the columns "pre" and "post"). Remark: one person who took part in the post-questionnaire did not take part in the initial one and three from the initial one did not take part in the post-questionnaire.

**Table 8: List of Visualisation Criteria - Comparison pre and post field trial**

	NL	AT	pre	post
Collection of data, privacy, consent	x	x	4	1
Don't use pop ups and ads	x		4	4
Make pop ups easy to remove if you have to use them	x		5	2
Don't show too much info, as this could be overwhelming	x	x	2	1
Make sure images match with the content	x	x	3	4
Make sure graph visualisations are labelled	x		4	2
Font often too small	x	x	1	3
Good contrast is important	x	x	5	5
Getting familiar too time consuming		x	5	1



Language: easy and native	X	X	5	4
Adaptability (level of detail, set own goals)		X	2	3
Motivate to use / engage with it	X	X	3	4
Avoid scrolling (all information on 1 screen)	X	X	1	0
Highlight important information (e.g. using 'signal colours')	X	X	3	3
Missing measurement points shouldn't cause problems in visual representation		X	1	2
Buttons / interactive elements are too small	X	X	1	2

When looking at Table 8, several items were rated the same or did not change significantly (i.e., only by one score) pre and post. For example, the items 'Don't use pop-ups and ads', 'Highlight important information' and 'Good contrast is important' were rated the same pre and post use of the interactive prototype and Fitbit, and several items including 'Language: easy and native', for example, were rated with a similar score (5 vs. 4) pre and post. This means that these items were confirmed in their level of importance. This may be (partly) caused by using the app: e.g., 'Avoid scrolling' was not rated very important in the first place (score: 1) and it was not relevant for using the app either (score: 0). Another interpretation is that even after some time, the participants confirmed the level of relevance of the scores independent of using the app.

However, it is also striking that several scores dropped significantly pre vs. post field trial. They were quite important at first (score: 4 or 5) and appeared less important (score: 0 or 1) post field trial. 'Collection of data, privacy and consent' is one example. The low score of the latter in the post judgement might be influenced by two facts: the researchers guided the participants through the installation process and they did not have to do it alone as they would have 'at home' and second during the course of the Co-design process some trust towards the researchers has been established and so the participants trusted the researchers that the apps that are to be installed are trustworthy as well. Interestingly, the application used during the field trial did collect a lot of data and participants also talked about the positive aspect of the information they got out of the data collection by the Fitbit app.

The item 'Make pop-ups easy to remove if you have to use them' was rated 5 first and 2 later; where only the Fitbit app did make use of pop-ups, the Activity Coach app did not. The fact that the AC app did not use pop-ups could have drawn less attention to this issue; where a potentially positive experience of the Fitbit app using pop-ups could make this issue be perceived less problematic. Another interesting aspect is the item 'Getting familiar too time consuming', which dropped from score 5 to 1. This could be interpreted in a way that the participants were not facing the issue of the app(s) requiring a lot of time for familiarization, as this topic appeared less important after testing the app compared to before testing it, which could also mean that the Activity Coach app as redesigned during the project was designed in a way that is easy to learn and understand.

There is only one item that was rated more than one score higher post vs. pre: 'Font often too small' (score: 1 pre, 3 post). This could be due to the fact that one of the apps had slightly smaller fonts than it would be ideal, which was however not explicitly discussed in the feedback session.



NL

The field trial resulted in feedback that was grouped in four categories: General experiences, testing practicalities, test confusion and preferences. Overall, participants were enthusiastic about the testing period: they had enjoyed using the Fitbit wristband and app, as well as the Activity Coach app. Furthermore, they had discovered the joy of learning by trial and error. And some had been far more active than expected and had enjoyed it. They were critical about limitations that were partly the result of current testing set up, combining the Activity Coach app with the Fitbit wristband.

**General experiences of the participants:**

- All participants had enjoyed using the Fitbit and the Activity coach app.
- It had inspired them to learn more about the technology and that was very rewarding
- It gave participants trust in their own abilities; they had overcome the anxiety to use it.
- Just tapping it and see what happens; learning by accident.
- It also inspired them to move: either walking or cycling.
- Some had set and strived for personal goals, others not.

**Testing practicalities:**

- Few in-between contacts of the participants with the facilitators. The procedure seemed clear.
- Several participants had received help with the downloading and use of the application from relatives etc.
- All participants had completed the diaries.
- Charging the Fitbit proved to be no problem.
- The testing did not upset the heart support technology of one of the participants, as was the concern of this participant.
- Also worked when crossing the German border, and back.
- Showering with the Fitbit was no problem

**Test confusion:**

- Despite the instructions, participants were confused as to the focus of the testing period. They talked mostly about the Fitbit, rather than the Activity Coach app.
- They seemed to have used the Fitbit more than the Activity Coach app. This was due to the fact that it had more functions.
- The steps function did not show the results per week.
- The synchronisation of the steps in the Activity Coach app based on the Fitbit took time. This discouraged the use of the Activity Coach app.

**Preferences:**

- The Activity Coach was appreciated for its simplicity and limited information.
- Nice that having no outdoor internet did not limit the use of the Activity Coach app.
- Nice that all data are automatically saved.
- The Activity Coach visualisations were clear to the participants.
- Preferred additional functions: sleep, cycling/other activities, blood pressure, calory use, and for some: body weight.
- Participants preferred the use of more colours in the Activity Coach app.
- They would like to have rewards and positive feedback into the Activity Coach app.
- And a short video on how to use it.

## *Lessons Learned and Feedback on the Co-design Activities*

### AT

When discussing the entire co-design process with the participants, we received the following feedback: The participants appreciated the opportunity to engage with technology and to remain more open. They felt inspired to try out new things. They also found the researchers very helpful throughout the process. Concerning the meetings, they appreciated that we included visual formats like presentations/slides instead of having audio (or talking to them) only. The number of participants present (five) was rated as a good group size so everyone had the opportunity to speak up. The food and drinks provided were appreciated as well. Concerning the devices, they were motivated by getting feedback about their movement and lifestyle. Even though technology is not necessary for ageing as stated, participants felt more up-to-date by having the opportunity to engage with technology through the process. They all wanted to be involved in future sessions /projects if these were conducted and they were all very happy to be able to keep the wristband as a thank you present.

The participants also rated the sessions on a sheet of paper that we handed out. According to the ratings, there seems to be a tendency that activities where the participants can actively work with and try out (new) technologies were liked most, as the favourite sessions were the ones where the wristband and the apps were handed out together with the field trial and the session where the participants conducted predefined tasks on a clickable prototype. Those are followed by the session where the participants were asked to create their own visualisations. Collecting visualisations at home and the session where we discussed the topic of visualisations of eHealth data in daily life got the lowest marks.

### NL

Participants seemed to enjoy all sessions. They had a personal drive to participate and improve technology for people like themselves. They were also eager to learn and appreciated having conquered another hurdle. In learning they were not limited to the Got-IT sessions and contacts with the researchers. They talked about the above hurdles with family and friends and tried to solve them with them.

- The use of an additional device and app (Fitbit) proved to make the task difficult for the participants.
- It also made it difficult for the researchers to draw conclusions on the Activity Coach app as participants often confused the Activity Coach app and the Fitbit app.
- The participants enjoyed the co-design sessions. They felt they had contributed to something concrete and worthwhile. Participation had boosted their self-confidence and they realised that they could learn and conquer their limitations and anxieties about eHealth.
- The positive experiences also inspired physical activity and taught them that it can be fun to be physically active.
- Participants are wary of privacy issues and involuntarily buying online services.
- Participants have a broad and practical view of technology usage: they remind the researchers of issues like safety of app use in heart patients, privacy issues, and usability when crossing national boundaries.

## **2.5 EXPERIENCES/IMPRESSIONS BY A DESIGNER OF EHEALTH APPLICATIONS**

A designer of eHealth solutions has been present at the “Designing Visualisations” session in the Netherlands and reports on her experiences attending this session as follows:

*“As the designer of the Activity Coach app, participating in the co-design session organized in Utrecht was a very interesting experience and full of learnings. It was great to see the users interact with the prototypes and see the app from and through their perspective.*

*One of the most insightful parts of the session was when the participants were creating their own app screens. It was a great learning experience to see how they approach navigating through an application "page", how they would place each element and where as well as gain insight in what does and does not work for the end-users.*

*Quite often low eHealth literacy is overlooked in the design process, especially as most of us designers are used to fairly complex apps and technology has become very intuitive for us. By taking place in this co-design session, I realized how something, which is very obvious for an experienced user, can be a bit too complicated for a user with low eHealth literacy. This way I can better approach any future designs of applications by taking into accounts the perspectives of these users too.”*

### 3 RECOMMENDATIONS FOR VISUALISATIONS OF EHEALTH DATA

Throughout our co-design sessions, we developed a table with recommendations for visualisations of eHealth data together with our co-design team. The recommendations were iteratively developed, adapted and extended throughout the sessions, and they are categorized within the topics of *Presentation, Usage, and General Conditions*. The topics can also be regarded as a checklist for developers. The recommendations are presented in Table 9.

**Table 9: Recommendations for designing visualisations in three categories, based on the findings in our co-design process**

Category	Recommendation
Presentation	Don't show too much information, as this could be overwhelming
	Make sure graph visualizations are labelled
	Avoid scrolling, show all information on one screen
	Use bigger font size, as fonts (and 'buttons') are often too small
	Highlight important information (e.g. using 'signal colors')
	Good contrast is important
	Make sure images match with the content
	Avoid background drawings and pictures
	Missing measurement points shouldn't cause problems in visual representation
	Save the colour red for when it is meant to signal danger
Usage	Don't use pop ups and ads
	Make pop ups easy to remove, if you have to use them
	Language should be easy to understand and native; consider adding minority languages
	Take into account that getting familiar is often too time consuming and frustrating
	Adaptability: consider levels of detail, allow to set own goals
General Conditions	Motivate people to engage with it (praise, rewards)
	Consider collection of data, privacy concerns, consent
	Be clear about paid services
	Add option of audio, e.g., to read aloud the content of the app / visualisation
	Add general information or warning about consulting a doctor in case of medical conditions

*Presentation* refers to recommendations that are about visual design choices, and we give ten recommendations here. Participants stated that too much information on screens can be overwhelming, participants don't know which information is the most important, and therefore it is crucial to only show the most important information on a screen. According to the participants' voices, we recommend to provide a good overview of the information that fits one entire screen so that it is

not necessary to scroll. For better presentation, the size of font and buttons was also discussed as being important, as it should be large enough. The most important information should be highlighted, however, not using the colour red as this is associated with danger and would leave people with a feeling of anxiety. In particular, graph visualisations should be labelled, e.g., describing clearly what a data presentation means, also given people with low eHealth literacy are not always familiar with such visualisations. Good contrast is important and it could be also used to make information better accessible. One participant in Austria was also concerned about the visualisation of measurement points where missing measurement points should not make the visualisation confusing, e.g., by showing 0 within a graph only because a measurement has not been conducted.

Regarding *Usage*, we have five recommendations. Participants discussed that new applications can be sometimes overwhelming, and the process of getting familiar with a new application is often very time consuming and frustrating. This can demotivate people, which needs to be taken into account. Pop-ups can be confusing and should be avoided; however, if they are really necessary to use, they should be very easy to remove. Language should be easy to understand, for example, not expecting people to understand medical or technical terminology, and using native language (in our case, German or Dutch) is crucial (instead of English, for example, if this is not the native language of the users). Participants were also concerned with data visualisations, especially regarding pre-set goals and levels of details shown in visualisations: They expressed the desire to set their own goals. Further, given the individual differences of participants in their experience of using eHealth applications, we recommend adaptability and personalisation in setting goals, and in showing levels of details.

We also have five recommendations concerning *General Conditions*. These include the topic of motivation: eHealth applications should consider motivating people in a positive way. To make information more accessible, an option would be also to use audio. Given some people may have injuries/health conditions and our specific application did not intend to replace a proper treatment by a doctor, a general information could be added in such a case about consulting a doctor in case of medical conditions. Privacy should be also of high priority, and we recommend transparency about data collection and paid services.

It is intended to use the presented table in two ways:

1. as a general guideline for designing eHealth applications
2. within the Co-design process as a tool to evaluate and / or reflect on which aspects are most important for the involved user group

How some of the recommendations have been implemented during the course of the project can be seen in Annex 5.3.

## 4 CONTENT FOR THE CO-DESIGN SECTION OF THE TOOLKIT

The following sections present the content of the co-design section of the Got-IT toolkit.

### 4.1 RECOMMENDATIONS FOR CO-DESIGN

Based on the experiences and evaluations of the activities of this WP the following recommendations are offered for researchers and developers for conducting co-design sessions with people who have low eHealth literacy:

**Atmosphere:**

- Take time to get to know and inform participants individually beforehand
- Take time to welcome participants individually and as a group
- Be generous with coffee, tea, biscuits and lunch
- Allow ample time for introductions and social talk

**Process and planning:**

- If possible, make sure to have two moderators for every group session. Preferably the same for every session
- If possible, use the same location for all meetings
- Allow for 30 minutes extra time before and after group sessions in the schedule/room booking: Participants often rely on public transport or individual help for transport.
- Check that navigation within the building and to the location and parking sites is clear and meets accessibility requirements.
- Make reservations for parking sites if necessary
- Make sure personal supporters have a pleasant space to wait for the group session to end
- Make sure participants can contact you before and after the sessions, in case something happens
- Give participants a short break during sessions that last over 60 minutes

**Group dynamics:**

- Start every session with stating some social rules on privacy and confidentiality, allowing everybody to have a say and being respectful towards each other
- Make sure that participants get to know each other by name (e.g., supported by name tags)
- Act respectfully towards every participant, thus setting an example
- Make sure that every participant has a voice
- Moderators reflect on group dynamics after every session.

**Recognition of value of co-designers' contribution:**

- Express the value of participants' contribution repeatedly. This can be done in general terms, but also make sure to be as specific as possible: What specifically was valuable in this session?
- Show participants in follow up sessions what was improved / changed on the basis of their comments
- Closing the involvement of the co-design team – recognition and reimbursement of participation and expenses:
  - In many or even most cases participants do not get any refunds for participation (apart from extra travel expenses that might occur). If possible, incorporate in the budget a generous refund pot.
  - In case a refund is offered to participants, make sure that the administration around refund claiming is made as easy as possible for participants
  - Facilitate prompt payment of refund and check this with the participants
  - Also, participants may appreciate it when they can keep any gadgets that they used to test during the project
  - Send your participants a brief report about the project outcomes and their contributions to these
  - If feasible, discuss the reimbursement options at recruitment or at the beginning of the project to make sure that the reimbursement is as preferred

Co-design activities:

- Involve participants actively in the co-design process by letting them perform (creative) tasks like designing or exploring new technologies
- Keep people involved even though they cannot attend a (group) activity (e.g., by giving individual tasks)
- Not every activity has to happen with researchers present. There are tasks people can do at home giving them more time to reflect and the possibility to reflect on issues in the context of their daily lives.
- Support your explanations, presentations and discussions visually (e.g., by using slides, flipcharts, whiteboards or handouts)

## 4.2 ETHICAL CONSIDERATIONS

Based on two MEESTAR<sup>8</sup>-Workshops held in the beginning and towards the end of the project period with the project consortium, the following key points were formulated as important ethical aspects that should be considered in the context of a co-design process. Every key point is presented as a problem with an associated solution.

The considerations are all within the range of interpersonal context, privacy and successful outcome of the co-design process. The co-design process can only succeed and lead to good results when there is a good basis of trust, respect, mutual appreciation, transparency, reflectiveness and care is taken to ensure that participation is possible and enjoyable for all important end user groups.

- Consideration 1
  - Issue: Participants might feel overwhelmed in the co-design process (e.g. due to the fear that they do not meet the expectations or because researchers and developers might overestimate their capabilities).
  - Solution: Be very careful and adjust individual co-design steps to the participants. Always check with them if they are able to move to the next step and empower the participants (reassure them and make them aware of their crucial role to the design process).
- Consideration 2
  - Issue: The expertise of (e.g. older) participants might be underestimated and consequently, they do not feel taken seriously and refuse to participate.
  - Solution: Be open-minded, listen to participants' experiences and value their contributions. Remember that participants are experts in their own right.
- Consideration 3
  - Issue: Risk of bias on the part of the researchers or designers towards specific end user groups (e.g. certain expectations, experiences, prejudices), which might cause problems during the co-design process (e.g., see Consideration 1 and 2).
  - Solution: Be aware of this, reflect and adjust if possible.
- Consideration 4
  - Issue: Inequality of possibilities to contribute. This problem may arise through generalisation and when all participants are treated in the same way, even though

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<sup>8</sup> Model for Ethical Evaluation of SocioTechnical Arrangements (Manzeschke, Weber, Rother and Fangerau, 2013)

every participant acts differently in the group resp. in the co-design process, e.g. people are more or less talkative.

- Solution: Facilitate participants' chances to contribute equally, by considering individual differences in regard to their capabilities and expertise. Also consider their different "life-worlds" (experiences, prejudices, position to certain topics).
- Consideration 5
  - Issue: No equal chances for participation in the project, which can create a research bias if specific end user groups are not represented. Reasons for this can be limited access to certain end user groups, accessibility issues for participants due to a lack of a required device (e.g. smartphone), lack of internet connectivity, or due to a lack of financial resources, education and skills, knowledge of new technologies, usability and even a lack of interest.
  - Solution: Be careful about exclusion/inclusion criteria and be creative in the recruitment process (e.g. using colleagues and other sources to help find solutions for recruitment). Choose accessible and low threshold products in the co-design process and if possible, provide the participants with necessary equipment, at least for the corresponding period. At any rate, be aware of a possible bias.
- Consideration 6
  - Issue: Disappointment of participants who are assigned to the control group, resp. who do not receive a reward for participation.
  - Solution: Use randomisation for the allocation of participants or distribution of rewards and communicate this clearly and transparently.
- Consideration 7
  - Issue: Pressure and comparison between participants might lead to injury or discomfort of participants.
  - Solution: Be aware of this possible issue and inform participants in advance that they are testing a prototype and that it is not them who are tested as users, but the device, so they should respect their own physical and mental limitations. Also provide the possibility to contact the trial managers if questions or issues occur.
- Consideration 8
  - Issue: Privacy issues might emerge in the co-design process. Sensitive data might be collected (either intentional or unintentional during co-design sessions) and project data might be lost or hacked.
  - Solution: Appliance of GDPR (Responsible data storage; use pseudonymisation and encryption. Use an informed consent and make participants aware of their rights. Ensure that all people involved act responsibly and GDPR compliant).
- Consideration 9
  - Issue: Uncertainties with collected private health data in health apps used in a co-design process
  - Solution: Prepare, discuss and read through privacy regulations of used products in order to provide profound information to participants. Avoid using apps unless necessary.




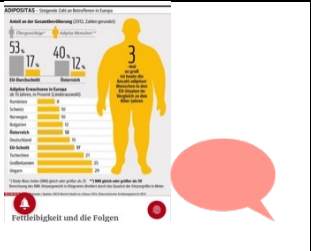

- Considerations 10
  - Issue: People might not be aware of the purpose of the results (e.g. for research, or the health sector) and the importance of their role. This could lead to a lack of enthusiasm for participation in the beginning as well as throughout the co-design process.
  - Solution: Actively make them aware of the benefits and the importance of their role.




### 4.3 SHOW CASE

The following table (Table 10) shows the co-design activities conducted within the Got-IT project in a very condensed version. This can be used as an example case to give an overview of how the process could look like in any other project. For each step, the conducted activities, aims and results are described and recommendations what to do or rather not are given as well.



**Table 10: Overview of the Co-design Process within the Got-IT project**

Step	Activity	Aim	Results/Product	Do's and don'ts	Illustration
Collecting Visualisations	Group session (NL), individual activity (AT)  Online (Whereby or e-mail) and phone, 2x10 participants  Project information, task instruction	Collect first impressions of participants' preferences of visualisations  Activate and motivate participants  Clear task instruction	Participants collect visualisations  Motivation	Warm welcome and appreciation  Do not rush  Check clarity of your instruction (especially when instructing happens via e-mail)	
Discussing Visualisations	4 Group sessions  Online or live, 4-5 participants/group  Sharing and discussing participants' photos	Insight in preferences re visualisations  General discussion about the topic	Photos of relevant visualisations  First list of preferences/criteria for visualisations	Make sure everybody feels included in the discussion  Take care that the discussion always gets back to the topic	
Designing Visualisations	2 Group sessions  Live, 4-6 participants/session  Discussing earlier findings and current app visualisations  Interactive: create best visualisations with paper, pencil and scissors	Insight in preferences re visualisations	Paper-pencil versions of (new or adapted) visualisations  Adapted list of preferences/criteria for visualisations to base App adaptations	Inspire creativity  Discuss embarrassment and show appreciation	

<p>Using the App</p>	<p>2 Group sessions 1 individual session Live, 4-6 participants/session Discussing current criteria list Download (prototype) app, explore and discuss current app visualisations based on predefined tasks</p>	<p>Insight in preferences re visualisations and interacting with the visualisations</p>	<p>Adapted list of preferences/criteria for visualisations to base App adaptations</p>	<p>Prepare technicalities re app itself and devices of participants Mind limited tech literacy</p>	
<p>Setting up the Devices</p>	<p>2 Group and 3 individual sessions Live, 3-5 participants/group Setting up the devices for the field trial and instruction</p>	<p>Motivated, well set up and instructed participants for field trial</p>	<p>Participants use app during 1 week</p>	<p>Allow for back up during the week Prepare for different technical issues that might occur (not all, but many will!)</p>	
<p>Discussing the Usage</p>	<p>2 Group and 1 individual sessions Live, 5 participants/group Discussing usage experiences Hand out any free devices</p>	<p>Insight in trial experiences and preferences re visualisations</p>	<p>Adapted list of preferences/criteria for visualisations to base App adaptations</p>	<p>Demonstrate how participants have contributed over all sessions. Show appreciation</p>	

The following table (Table 11) shows the final ranking of the priorities towards visualisations within eHealth applications by the Co-design team (22 people with low eHealth literacy in Austria and the Netherlands) taking part in the Got-IT project. The items shown differ slightly from the final recommendations (Table 9) as some were added after the final evaluation of the data gathered throughout the process.

**Table 11: Rankings of design recommendations by the Got-IT Co-design team**

	importance
Good contrast is important	Very high
Language: easy and native	Very high
Collection of data, privacy, consent	High
Don't use pop ups and ads	High
Make pop ups easy to remove if you have to use them	High
Make sure graph visualizations are labelled	High
Getting familiar too time consuming	High
Make sure images match with the content	High
Don't show too much info, as this could be overwhelming	Medium
Motivate to use / engage with it	Medium
Highlight important information (e.g. using 'signal colors')	Medium
Font often too small	Medium
Buttons / interactive elements are too small	Low
Adaptability (level of detail, set own goals)	Low
Avoid scrolling (all information on 1 screen)	Low
Missing measurement points shouldn't cause problems in visual representation	Very low

## 5 ANNEX

### 5.1 INFORMATION SHEET AND INFORMED CONSENT FORMS

#### 5.1.1 AUSTRIA



### Information

#### zur Teilnahme an der Arbeitsgruppe im Rahmen des Projekts Got-IT

Sehr geehrte\*r Teilnehmer\*in!

Wir laden Sie herzlich ein, Ihre Erfahrungen mit digitalen Informationen und Hilfsmitteln zum Thema Gesundheit in gemeinsamen Arbeitsgruppen einzubringen.

Die Arbeitsgruppe wird im Rahmen des Projekts Got-IT abgehalten. In diesem Projekt sollen Empfehlungen für Technologieentwickler und Anbieter erarbeitet und getestet werden, wie Informationen aufbereitet werden könnten, damit auch Menschen, die im Umgang mit digitalen Gesundheitsinformationen und Anwendungen manchmal Probleme haben, auf sie zugreifen und sie verstehen können.

Got-IT ist ein von der EU und der Österreichischen Forschungsförderungsgesellschaft gefördertes Forschungsprojekt und wird von der Johanniter Österreich Ausbildung und Forschung gemeinnützige GmbH (Österreich), der Technischen Universität Wien (Österreich), Roessingh Research and Development (die Niederlande), Pharos Expertisecentrum Gezondheidsverschillen (die Niederlande) und dem Danish Committee for Health Education (Dänemark) durchgeführt.

#### Ablauf

Die Arbeitsgruppe, bestehend aus insgesamt ca. 10 Personen, trifft sich 2-3 Mal zwischen Mai und August 2021 im Nachbarschaftszentrum 22. Jedes Treffen wird ungefähr 1-2 Stunden dauern.

Ihnen voraus geht ein Vorgespräch, in dem die vorliegende Information und Einwilligungserklärung erklärt werden und die Möglichkeit besteht, Fragen zu stellen bzw. Unklarheiten beseitigt werden können.

Geleitet werden die Vorgespräche und die Arbeitsgruppe von der Technischen Universität Wien, bei Bedarf unterstützt von der Johanniter-Forschung.

Im Rahmen des Vorgesprächs werden wir Sie bitten, über die Dauer von ein paar Tagen Bildmaterial von Beispielen für besonders gelungene oder auch misslungene Informationsaufbereitung in Ihrem Alltag zu sammeln und zum folgenden Arbeitsgruppentreffen mitzunehmen bzw. vorab zu senden.

In den Arbeitsgruppen werden die Erfahrungen der TeilnehmerInnen mit Schwierigkeiten im Umgang mit digitalen Gesundheitsinformationen und Anwendungen besprochen und Anforderungen und Ideen zu einer besseren Umsetzung gesammelt.

Die Workshops dienen dazu, die Bedürfnisse von Personen mit einer geringen digitalen Gesundheitskompetenz (d.h. Personen, die im Umgang mit digitalen Gesundheitsinformationen und Anwendungen manchmal Probleme haben) kennen zu lernen und festzuhalten.





## Daten und Datenschutz

Im Rahmen der Treffen werden zur besseren Dokumentation fallweise auch Tonaufzeichnungen und Fotos gemacht. Tonaufnahmen werden zur Gänze oder auszugsweise transkribiert. Es wird nicht ersichtlich sein, Aussagen einzelnen TeilnehmerInnen zuzuordnen. Für die Verwendung von Fotos wählen Sie bitte in der Einverständniserklärung die gewünschte Option.

Die Ergebnisse werden mit unseren ProjektpartnerInnen in den Niederlanden und Dänemark geteilt und im Sinne des Projektziels verarbeitet. Die in der Arbeitsgruppe gewonnenen Informationen und Ergebnisse können zudem zur Berichtslegung gegenüber des Fördergebers als auch für wissenschaftliche Publikationen herangezogen werden.

Alle Daten werden entsprechend der EU Datenschutz-Grundverordnung (DSGVO) behandelt, in pseudonymisierter Form und nur zum Zwecke des Projektvorhabens genutzt. Sie haben das Recht, jederzeit von der Teilnahme zurückzutreten und um die Löschung Ihrer Daten anzusuchen. Aus diesem Recht entsteht Ihnen kein Nachteil.

Weiterführende Informationen zur DSGVO finden Sie bei der österreichischen Datenschutzbehörde unter: [www.dsb.gv.at](http://www.dsb.gv.at)

## Kostensatz und Vergütung

Leider ist es und nicht möglich, Ihre Teilnahme am Projekt finanziell abzugelten.

## Veranstaltungsort



Nachbarschaftszentrum 22  
1220 Wien, Rennbahnweg 27/2-3/R1, Eingang Austerlitzgasse

## Aus aktuellem Anlass

Die Treffen werden unter Einhaltung der jeweils gültigen Covid-19-Regelungen abgehalten. Dementsprechend sind aktuell alle Treffen im Freien geplant. Bitte nehmen Sie sicherheitshalber zu jedem Treffen eine eigene FFP2-Maske mit. Das Vorweisen eines negativen Coronatests ist nach aktuellem Stand nicht notwendig. Sollte es Änderungen geben, werden Sie entsprechend informiert.

## Kontakt

Für weitere Informationen und Fragen wenden Sie sich bitte an:

Katharina Werner  
Tel.: +43 650 842 72 50  
E-Mail: [katharina@igw.tuwien.ac.at](mailto:katharina@igw.tuwien.ac.at)  
Human Computer Interaction Gruppe  
Technische Universität Wien



## Einwilligungserklärung

### zur Teilnahme an der Arbeitsgruppe im Rahmen des Projekts Got-IT

Vor- und Nachname (in Druckbuchstaben): .....

Geb.-Datum: .....

Ich erkläre mich bereit, als Teil der Got-IT Arbeitsgruppe in Wien an den Treffen ebendieser teilzunehmen. Ich hatte ausreichend Zeit, mich für die Teilnahme zu entscheiden.

Ich habe die Informationen zur Got-IT Arbeitsgruppe gelesen und verstanden. Ich bin mir über dessen Ziele und Zwecke, sowie über meine Mitwirkung am Projekt bewusst. Aufgetretene Fragen wurden mir verständlich und ausreichend beantwortet. Ich habe zurzeit keine weiteren Fragen mehr.

Ich werde mit den ProjektmitarbeiterInnen im Sinne der Durchführung der Arbeitsgruppe zusammenarbeiten.

Ich bin damit einverstanden, dass Ton- und Bildaufnahmen gemacht werden, dass diese in pseudonymisierter Form transkribiert, ausgewertet und analysiert werden und für die Entwicklung von Got-IT, wissenschaftliche Publikationen und weitere Forschungsarbeit verwendet werden.

Fotos auf denen mein Gesicht sichtbar ist, dürfen auf folgende Weise verwendet werden:

- Anonymisiert (Gesicht verschwommen)
- Gesicht erkennbar

Ich behalte mir das Recht vor, meine freiwillige Mitwirkung jederzeit zu beenden, ohne, dass mir daraus Nachteile entstehen. Die Rechtmäßigkeit der aufgrund der Einwilligung bis zum Widerruf erfolgten Verarbeitung personenbezogener Daten wird davon nicht berührt. Ein etwaiger Widerruf ist unter [katharina@igw.tuwien.ac.at](mailto:katharina@igw.tuwien.ac.at) schriftlich mitzuteilen.

Ich habe jederzeit das Recht auf Auskunft, Berichtigung, Löschung, Einschränkung der Verarbeitung, Datenübertragbarkeit, Widerspruch, sowie ein Beschwerderecht bei der Datenschutzbehörde nach Maßgabe gesetzlicher Bestimmungen.

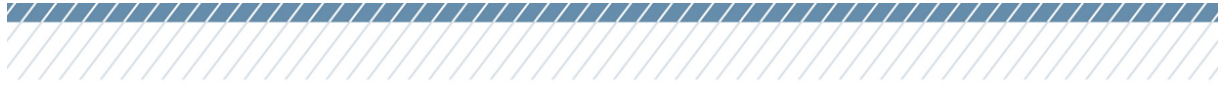
Beim Umgang mit den Daten werden die Bestimmungen des Datenschutzgesetzes beachtet.

Eine Kopie der vorliegenden Teilnahmeinformation und Einwilligungserklärung habe ich erhalten. Das Original verbleibt beim Projektteam.

.....  
(Ort, Datum und Unterschrift der/des TeilnehmerIn)

.....  
(Ort, Datum und Unterschrift der durchführenden Projektmitarbeiterin)

5.1.2 THE NETHERLANDS



TOESTEMMINGSFORMULIER  
GOT-IT

- Ik begrijp dat Carolien Smits en Bassima el Haik mij willen vragen naar mijn ervaring met gezondheids-apps.
- Ik begrijp dat **alleen** Carolien Smits en Bassima el Haik en andere onderzoekers van het GOT-IT-project mijn naam en verhaal horen.
- Ik begrijp dat deze studie ontwerpers van apps helpt.
- Ik heb genoeg tijd gehad om na te denken of ik mee wil doen met deze studie.
- Ik weet dat ik kan stoppen wanneer ik wil met deze studie
- Ik doe mee aan deze studie.

Naam: .....

Handtekening: ..... Datum: .....

**Z.O.Z.**



Ondergetekende, verantwoordelijke onderzoeker, verklaart dat de hierboven genoemde persoon zowel schriftelijk als mondeling over het bovenvermelde onderzoek is geïnformeerd. Hij/zij verklaart tevens dat een voortijdige beëindiging van de deelname door bovengenoemde persoon, van geen enkele invloed zal zijn op de zorg die hem of haar toekomt.

Naam:

[titel, voornaam en achternaam onderzoeker]

[titel, voornaam en achternaam onderzoeker]

Functie: Onderzoeker(s)

Handtekening: ..... Datum: .....





## Toestemmingsformulier voor foto's

Ik geef toestemming dat er tijdens dit bijeenkomst op 7 juli 2021 bij Pharos foto's worden gemaakt.

Deze bijeenkomst is voor een onderzoek waar Pharos aan meedoet. Het heet Got-IT.

Ik geef die toestemming alleen onder de volgende voorwaarden:

- De foto's worden nergens anders voor gebruikt als voor het onderzoek waar Pharos aan meedoet.
- De foto's mogen worden gebruikt voor materialen (drukwerk en digitaal) ter ondersteuning van het onderzoek van Pharos.
- Mijn gezicht staat niet op de foto's

Ik begrijp dat de foto's worden gebruikt voor het onderzoek van Pharos.

Eline Heemskerk heeft mij in de gelegenheid gesteld om vragen te stellen. Al mijn vragen zijn beantwoord.

### Deelnemer sessie:

_____	_____	_____	_____
Achternaam	Voornaam	Datum	Handtekening

### Onderzoeker:

_____	_____	_____	_____
Achternaam	Voornaam	Datum	Handtekening

Contactgegevens: Eline Heemskerk van Pharos. [E.heemskerk@pharos.nl](mailto:E.heemskerk@pharos.nl)

## 5.2 PHOTOVOICE INSTRUCTIONS

### 5.2.1 AUSTRIA

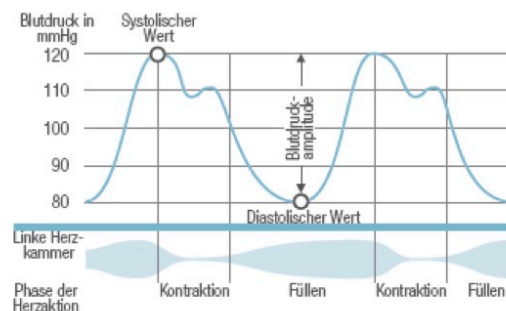
#### Foto-Sammlung von Gesundheitsdaten im Alltag

Gibt es Bilder, Grafiken oder Informationen zum Thema Gesundheit, die Sie besonders mögen oder gut verstehen? Gibt es andere oder Teile davon, die Sie besonders schlecht verstehen oder weniger mögen?

Wir möchten Sie bitten, die nächste Woche mit besonders offenen Augen durch den Alltag zu gehen und Ausschau nach **Grafiken, Bildern** und anderen Darstellungen von Informationen **zum Thema Gesundheit** zu halten. Diese können zum Beispiel aus Zeitungen, Magazinen oder auch aus dem Internet oder Fernsehen stammen. Wenn Ihnen hier Beispiele unterkommen, die Sie als besonders gut oder auch besonders schlecht verständlich empfinden, möchten wir Sie bitten, diese mit einem **Foto** festzuhalten. Ebenso ist es möglich, Ihre eigenen Messungen von Werten zu fotografieren, sofern Sie solche Messungen z.B. mit einem Handy, Tablet oder mit einer Fitness-Uhr vornehmen.

Sofern Sie dazu die Möglichkeit haben, **schicken Sie bitte 5 Ihrer Fotos** vor unserem nächsten Treffen an Fr. Katharina Werner unter [katharina@iqw.tuwien.ac.at](mailto:katharina@iqw.tuwien.ac.at). So können wir diese für diesen Termin ausdrucken. Andernfalls bringen Sie bitte einfach das Gerät, mit dem Sie die Fotos aufgenommen haben, bzw. eventuelle Zeitungsausschnitte zu unserem nächsten Treffen mit.

Beispiele für Gesundheitsdaten können, müssen aber nicht so aussehen:



Bildquellen:

<https://pixabay.com/photos/watch-running-half-marathon-2104779/>

<https://www.beurer.com/gesundheitsratgeber/we-bilder/artikel/Blutdruckwerte.png>

## 5.2.2 THE NETHERLANDS

### Opzet 1<sup>e</sup> Co-creatie sessies

Praktische zaken:

**Data sessies:**

- Dinsdag 4 mei 2021, 10:00-11:00 uur (5 deelnemers)
- Donderdag 6 mei 2021: 14:00-15:00 uur (3 deelnemers)
- Vrijdag 7 mei 2021: 14:00-15:00 uur (3 deelnemers)

**Medium:** Whereby via <https://pharos.whereby.com/pharos>

**Toestemming:** Toestemmingsformulieren worden per post naar alle deelnemers verzonden.

#### Welkom en voorstelrondje (5 minuten)

- Uitleg over starten opname en het recht als deelnemers om altijd te mogen stoppen met de sessie (tekst zal aansluiten bij het document van Johanniter die we morgen ontvangen).
- Kort voorstelrondje (indien designers aansluiten).
- Korte terugkoppeling van de opdracht. De opdracht die is meegegeven was:

*Zoek 1 tot 6 plaatjes die iets over gezondheid laten zien.*

*Dit mogen hele duidelijke plaatjes zijn, maar ook hele ingewikkelde.*

*Bijvoorbeeld:*

- *een plaatje die iets laat zien over hoeveel je beweegt*
- *een plaatje die iets laat zien over bloeddruk*
- *een plaatje die iets laat zien over medicijnen.*

*Je mag de plaatjes zoeken op:*

- *apps die je gebruikt of die je familie gebruikt*
- *internet*
- *in de krant of in een tijdschrift*
- *op TV*
- *als het lastig is om iets te vinden mag je ook zelf tekenen!*

*Je mag je plaatjes naar mij mailen. Als het niet lukt, dan is dat niet erg.*

*Je mag de plaatjes dan gewoon laten zien tijdens onze volgende bijeenkomst.*

Vragen om te bespreken naar aanleiding van de opdracht:

- Wat vonden jullie van de opdracht?
- Wat vonden jullie lastig aan de opdracht?
- Wat vonden jullie makkelijk aan de opdracht?

#### Bespreken opdracht (45 minuten)

Een sommige deelnemers hebben foto's via de mail gestuurd en een paar laten de foto's tijdens de sessie zien.

Per deelnemer worden de foto's 1 voor 1 gedeeld. De foto's die via de mail zijn verstuurd worden getoond door de onderzoekers.

Vragen per foto aan de deelnemer:

- Wat maakt dat je dit plaatje hebt gekozen?
- Wat vind je er duidelijk of onduidelijk aan?
- Waarvoor kan dit plaatje gebruikt worden?
- Wat kunnen de makers van websites en apps over gezondheid leren van dit plaatje?

Vragen aan de andere deelnemers:

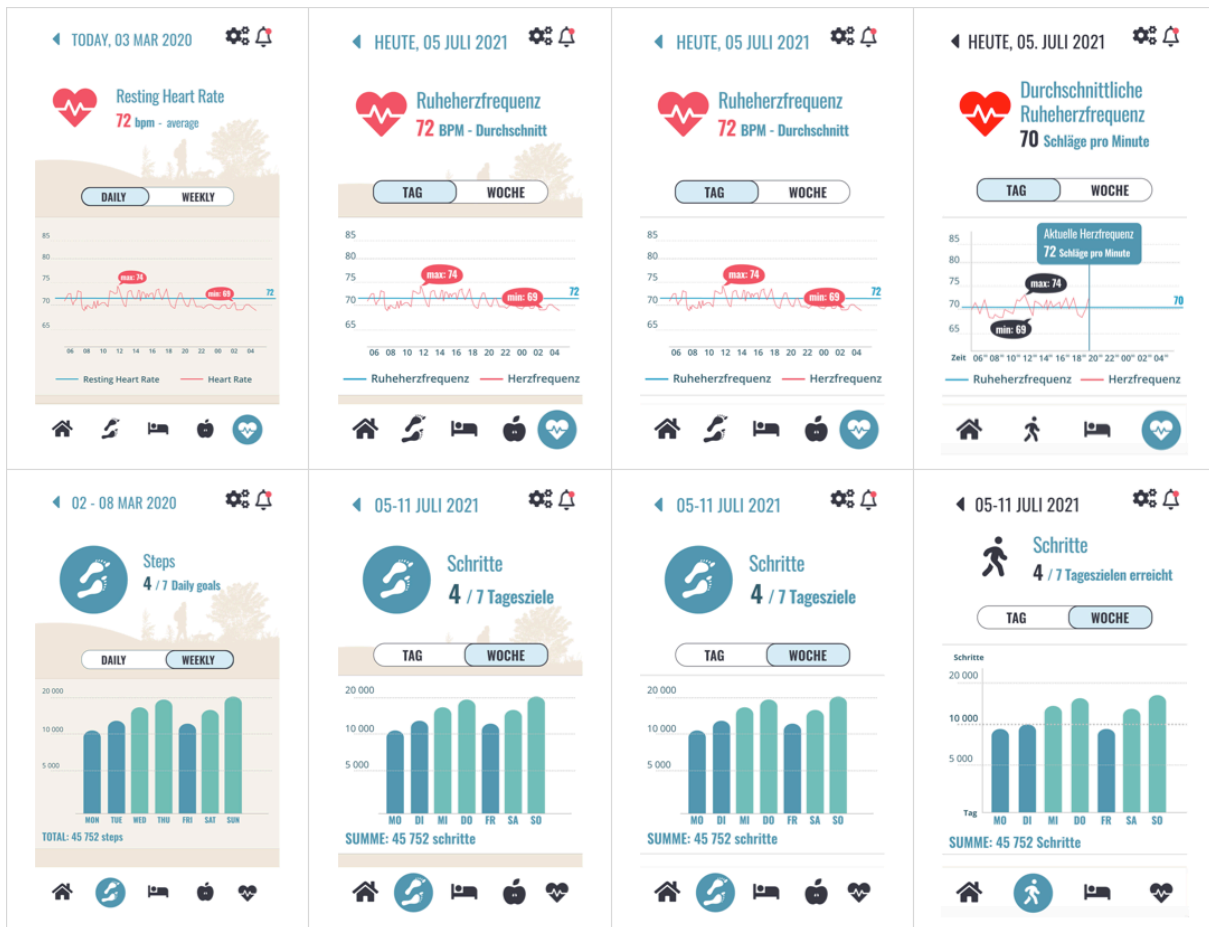
- Wat vinden jullie van dit plaatje?
- Hebben jullie zo'n soort plaatje wel eens eerder gezien? (Zo ja, waar?)

**Afronding (10 minuten)**

- Laatste vragen vanuit deelnemers of design team bespreken.
- Bedanken voor deelname.

**5.3 COMPARISON SCREEN DEVELOPMENT**

Example screens shown to the participants for comparison of the screen development and changes during the course of the co-design process from original screens to outer left to final screens in the clickable prototype at the outer right.



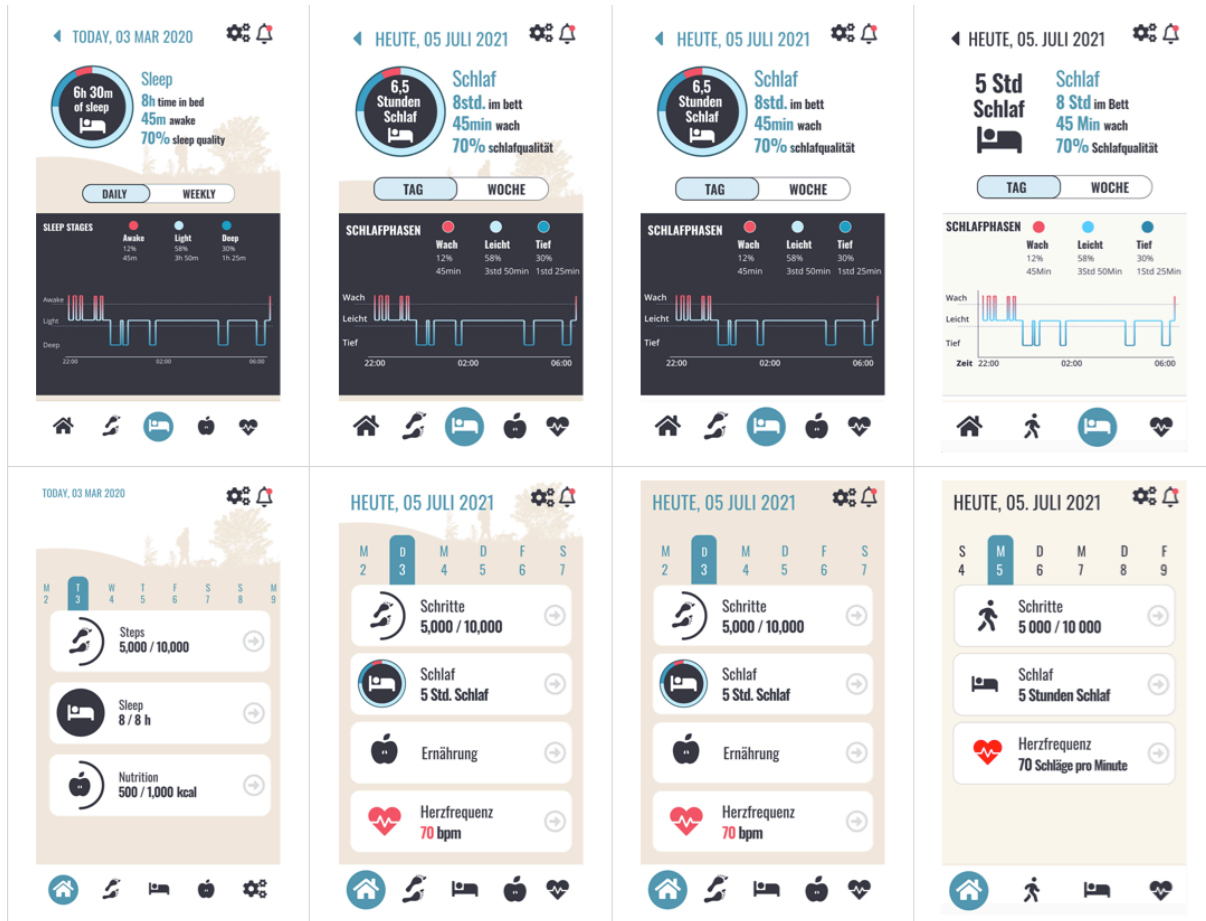
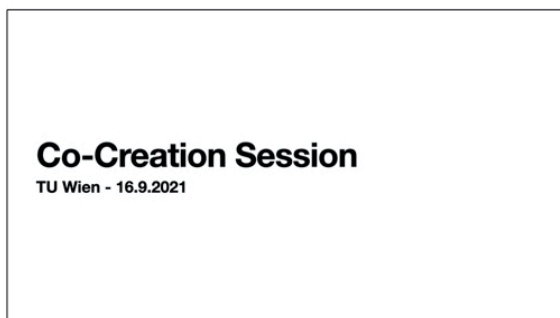


Figure 11: Course of the screen design changes during the co-design process

## 5.4 SLIDESHOWS USED DURING CO-DESIGN SESSIONS

### 5.4.1 USING THE APP



5.4.2 DISCUSSING THE USAGE

**GOT-IT**

## Impressionen der letzten Co-Design Aktivitäten

Isabel Schwaninger, Katharina Werner  
5.11.2021





### 1. "Hausaufgabe": Sammlung von Bildern



**Fettleibigkeit und die Folgen**

### 2. Diskussion der gesammelten Bilder




### 3. Erstellung eigener Visualisierungen für die App




### 4. Aufgaben anhand eines Prototypen durchführen



### 5. Installation der Fitness App, Übergabe der Geräte



### 6. Selbstständige Erprobung der Fitness App



### Abschlusstreffen: Feedback an uns...

Was hat Ihnen (am besten) gefallen?  
Was hat Ihnen weniger gefallen?

Wie können wir unsere Arbeit verbessern?



## 5.5 DIARIES USED DURING THE FIELD TRIAL

### 5.5.1 AUSTRIA



## Mein Projektstagebuch

Do, 28.10. – Mi, 03.11.2021

Vielen Dank, dass Sie die Activity Coach App für eine Woche ausprobieren!

Im vorliegenden Tagebuch finden Sie für jeden Tag **zwei zu beantwortende Fragen** plus etwas Platz für **freie Kommentare**, in dem Sie Ideen, aufgetretene Probleme oder wenn Ihnen einfach irgendetwas in der App oder allgemein zum Thema einfällt, niederschreiben können.

Wir empfehlen, das Tagebuch abends auszufüllen. Sollten Sie an einem Tag nicht dazu kommen, ist dies auch kein Problem und kann gerne am nächsten Tag nachgeholt werden.

**Wichtig:** Die tatsächlich gemessenen Werte sind für unser Projekt nicht wichtig. Uns geht es um den Umgang mit der App. Sie müssen daher das Fitnessarmband nicht den ganzen Tag tragen und können es jederzeit ablegen.

Sie sollten diese eigentlich nicht benötigen, dennoch hier sicherheitshalber Ihre Zugangsdaten für sowohl die Activity Coach- als auch die FitBit-App:

Benutzername:

Passwort:

**Viel Spaß beim Ausprobieren!** – Sollten Sie in einem Punkt Hilfe benötigen, können Sie im Handbuch nachsehen, oder sich unter [katharina@igw.tuwien.ac.at](mailto:katharina@igw.tuwien.ac.at), bzw. 0650 8427250 bei Fr. Katharina Werner melden.

**Donnerstag, 28.10.2021**

- Wie hoch ist das in der Activity Coach App vordefinierte Tagesziel an Schritten?
  
- Welches Tagesziel würden Sie selbst gerne erreichen?

Meine heutigen Ideen / Kommentare zur Activity Coach App:

3

**Freitag, 29.10.2021**

- Wie oft haben Sie die Activity Coach App heute geöffnet?
  
- Wie viele Schritte sind Sie heute gegangen?

Meine heutigen Ideen / Kommentare zur Activity Coach App:

4



**Samstag, 30.10.2021**

- Wie viele Schritte haben Sie heute von 12 – 13h gemacht?
  
- Haben Sie das Gefühl, dass die gezählten Schritte korrekt sind?

Meine heutigen Ideen / Kommentare zur Activity Coach App:

5

**Sonntag, 31.10.2021**

- Haben Sie die Activity Coach App heute geöffnet / verwendet? Was haben Sie damit gemacht?
  
- Wie viele Schritte sind Sie heute gegangen?

Meine heutigen Ideen / Kommentare zur Activity Coach App:

6

**Montag, 01.11.2021**

- Wie viele Schritte haben Sie am Freitag gemacht?
  
- Wie oft haben Sie das vordefinierte Tagesziel an Schritten bereits erreicht?

Meine heutigen Ideen / Kommentare zur Activity Coach App:

7

**Dienstag, 02.11.2021**

- Wie viele Schritte haben Sie gestern von 16 – 17h gemacht?
  
- Haben Sie die Activity Coach App heute geöffnet / verwendet? Was haben Sie damit gemacht?

Meine heutigen Ideen / Kommentare zur Activity Coach App:

8

**Mittwoch, 03.11.2021**

- Wie oft haben Sie das Tagesziel an Schritten in der letzten Woche erreicht?
  
- Waren Sie jemals überrascht über die Höhe der angezeigten Schritte?

Meine heutigen Ideen / Kommentare zur Activity Coach App:

9

**Abschließende Bitte**

Da noch etwas Zeit ist, bis wir uns wieder sehen, möchten wir Sie bitten, sich auch ein bisschen die FitBit-App, die wir bei unserem letzten Treffen ebenfalls auf Ihrem Handy installiert haben, anzusehen und mögliche Kommentare zu den Darstellungen der Daten entweder auch hier im Tagebuch festzuhalten oder uns dann einfach bei unserem nächsten Treffen zu erzählen.

Vielen Dank!

10

5.5.2 THE NETHERLANDS

Sample page as every page asked the same questions

## Dagboek bij gebruik Fitbit-horloge en Activity Coach App

Schrijf elke dag in dit dagboek over jouw ervaringen met de Activity Coach App

<b>Dag 1 - Dinsdag 19 oktober</b>
1. Hoe vond je het gebruik van de activity coach app vandaag?
2. Was er iets vervelends of leuks toen je de activity coach app vandaag gebruikte?

## 5.6 RATING SHEET CO-DESIGN ACTIVITIES

Bitte reihen Sie von 1-6, wobei 1 das Treffen bezeichnet, das Ihnen am Besten gefallen hat.

<p><b>1. „Hausaufgabe“ Grafiken sammeln</b></p> 	
<p><b>2. Diskussion zu Darstellungen von Gesundheitsdaten (anhand gesammelter Grafiken)</b></p> 	
<p><b>3. Erstellen eigener Visualisierungen</b></p> 	
<p><b>4. Durchführen von Aufgaben in einer Fitness-App</b></p> 	
<p><b>5. Installation der Fitness Apps, Übergabe der Geräte</b></p> 	
<p><b>6. Selbstständige Erprobung der Activity Coach App zuhause</b></p>	