SENSHOME
sensing special needs

Interreg
Italia-Österreich
European Regional Development Fund

EUROPEAN UNION

PARTICIPATION OF USERS IN RESEARCH: HUMAN-CENTRED DESIGN IN THE PROJECT SENSHOME

REMOTE | Tuesday, 20 April 2021

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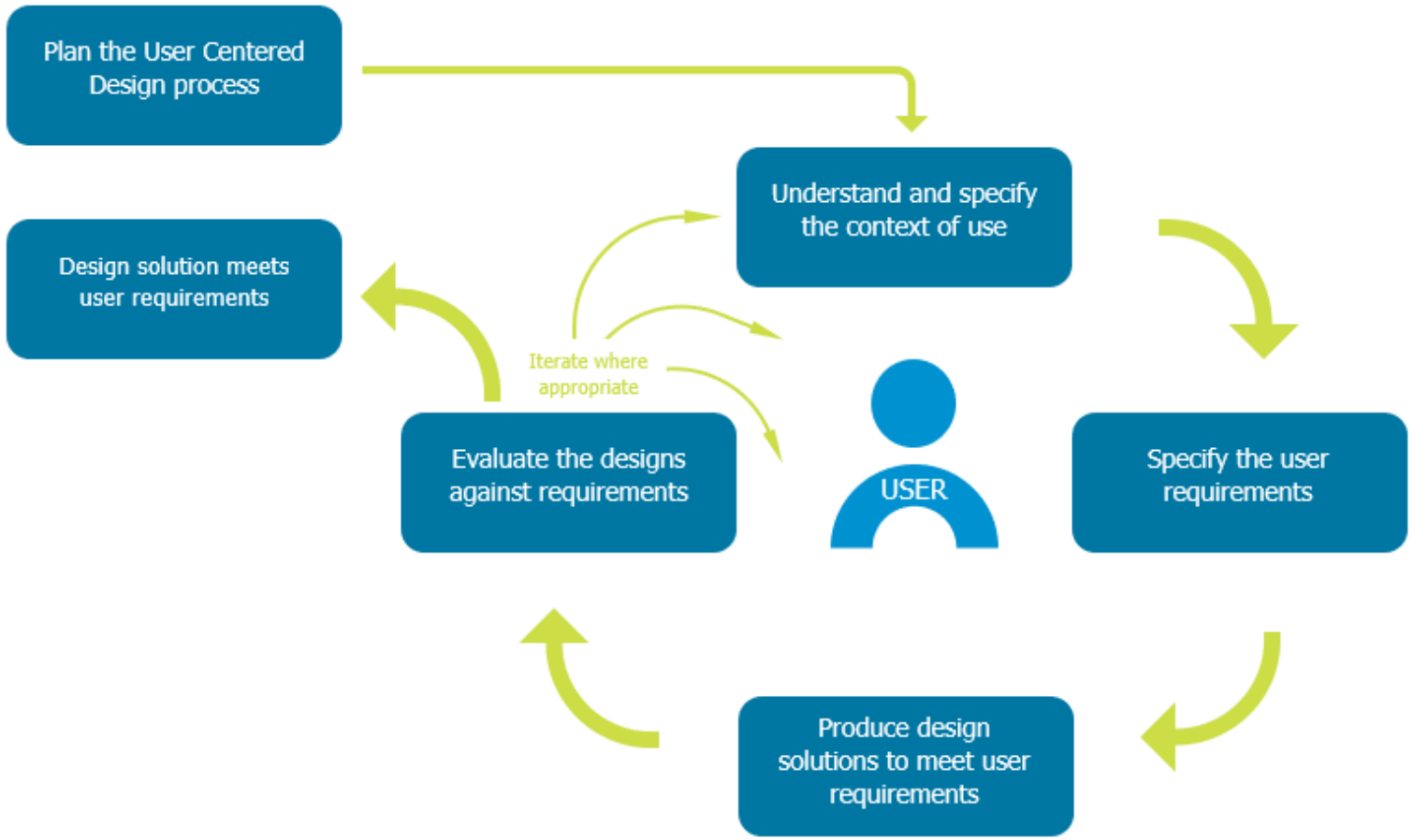
Agenda

- Human-Centred Design
- Time plan of the human-centred design process in SENSHOME
- Details on used methods in SENSHOME
- Planned user tests in SENSHOME

HUMAN-CENTRED DESIGN

DIN EN ISO-Norm 9241-210 Human-centred design processes for interactive systems



Human-Centred Design

DIN EN ISO-Norm 9241-210: Human-centred design processes for interactive systems

The User-Centered Design (UCD) approach is a design philosophy, which sets the

- Needs
- Wishes
- Limitations, restrictions and possibilities

of the end users in the center of the development process.

VS.

The purpose of the UCD approach is to address questions regarding the user groups' tasks and aim and use this information to draw conclusions regarding the system design and development. The retrieved information is evaluated in several stages.

Daniela E. Ströckl, 2019 (Basic principles in AAL development and User Involvement)

Human-Centred Design Methods

User interactions	Tools
• Focus groups • Interviews • Questionnaires • Usability testing	• Personas • Scenarios/User stories • Use-cases • Prototypes

User Interaction: Focus Group

- "…research focus groups are controlled interviews of a target audience that are led by facilitators" (DeVault, 2020)
- For a focus group to have an impact on the research a clear output/goal of the group has to be defined
- User can discuss predefined topics among themselves
- The goal is to get qualitative (not numerical) data/information

User Interaction: Interview

- Interviews are used when it is important to get detailed information from individual users
- Output from interview can often be used to design questionnaires
- The information can’t be used as information from the whole user group, as it is only from one opinion (at the time)
- It can be used to get a first overview
- To get clear answers the questions have to be short and clear

User Interaction: Survey/Questionnaire

- Surveys are used to get a lot of information from the users
- Surveys are perceived as very easy to create, but designing a reliable survey that outputs useful data can be very difficult
- Because of low response rates of surveys, on average ~33% (Lindemann, 2019), the survey needs to be sent to a large group of user to get enough data

User Interaction: Usability Testing

- User test the system and give feedback on the usability
  - Can the user complete tasks successfully?
  - How much does the user enjoy using the system?
  - Identify problems.
  - Find solutions
- Usability testing is a highly iterative process

Tools: Personas

- The future user moves to the center of the development process
- The "personas" method is suitable for developing a common, homogeneous image of the user (Arnold et al., 2005, Cooper, 1999).
- The user becomes tangible for everyone involved in the project. The aim is to gain insight into a probable user profile.
- The method does not claim to completely depict reality, but represents a model of the user, which is developed on the basis of the motives and goals of real users (Cooper & Reimann, 2003).
- Personas define archetypal user groups.

Tools: User Stories/Scenarios

- User stories are short description what the user wants to do with the system.
  - „As a parent I want to get an alert when the smoke detector senses smoke to keep my family save”
- User scenarios are similar to stories but with more details.
- User scenarios include goals, motivation and context/environment of the interaction with the system
- The users in theses stories and scenarios are represented by the personas developed for the project.

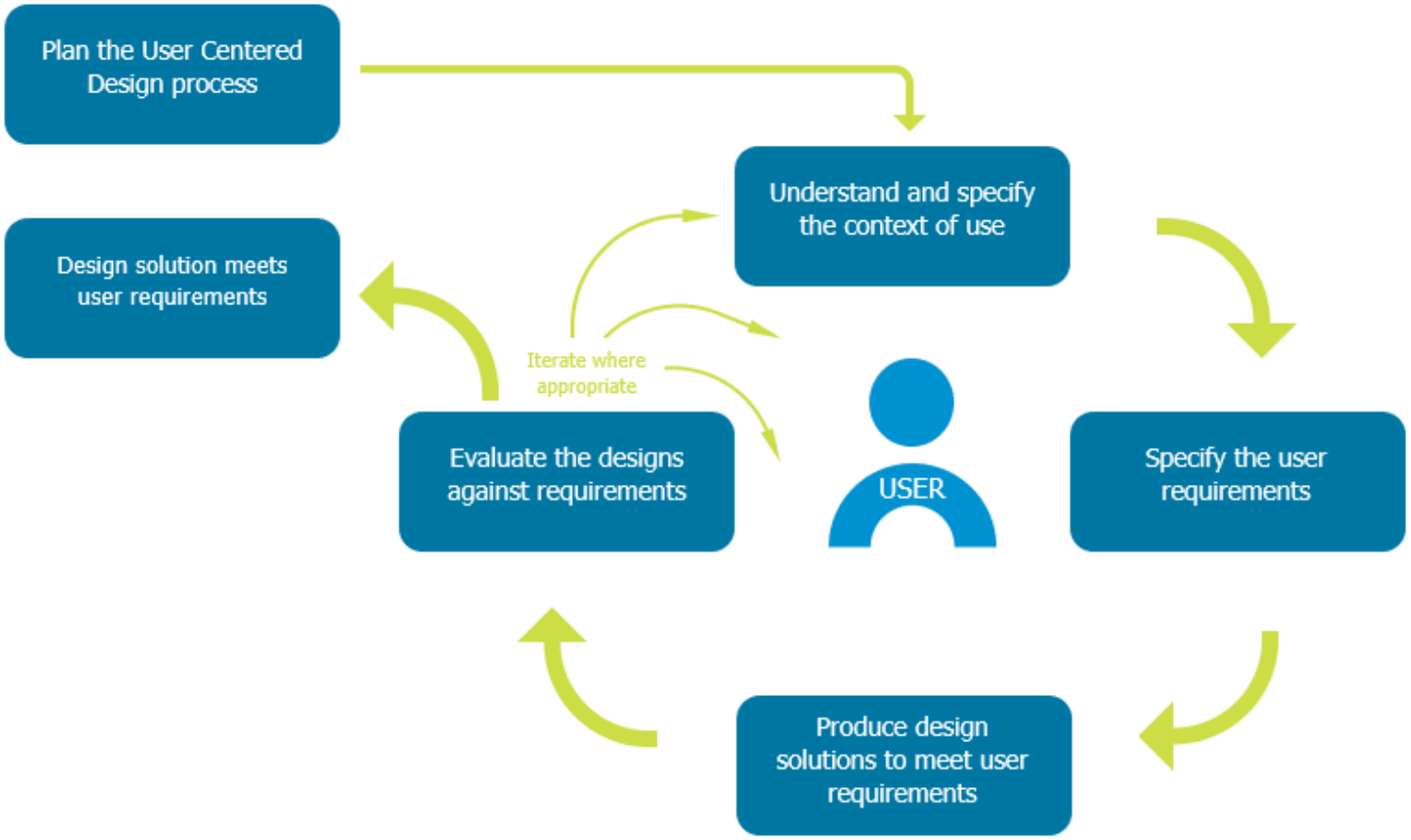
Tools: Use Cases

- “Description of a set of sequences of actions and variants that a system performs that yield an observable result of value to an actor.” (Jacobson, et. al., 1999, p.41)
- Use cases contain detailed information about all planned functions of the systems.
  - Context of use
  - Involved users/stakeholder
  - Steps from starting the system/opening the app to the desired outcome
  - What happens when there is an error in the system
- Use cases help the developers to implement all functions according to the user’s needs

Tools: Prototypes

- Paper prototyping
  - Ideas for the UI gets sketched on paper, often by the users themselves
  - Paper prototypes can be used as first ideas
- Card sorting
  - The cards used in this method represent different functions
  - Goal is to group the cards/functions to get the structure of the system
- Clickable mockup/Prototype
  - Clickable mockups look and feel like a finished system, but the final functionality is not given
  - They give the end-user the feel how the finished system will behave

User Interaction Methods



- Personas
- User Stories/Scenarios
- Use cases
- Prototypes
- Interview
- Survey/Questionnaire
- Focus group
- Usability testing

TIME PLAN OF THE HUMAN-CENTRED DESIGN PROCESS IN SENSHOME

Phase 0

January 2020

Call with an Expert (Psychologist)

- Feedback on drafted Personas

Workshops with Experts

- Definition of good practices to design for ASD people
- Inclusive design
- Autism design principles

Phase 1

April 2020 - July 2020

Series of Workshops

- Validation of Personas
- Daily routines of Autists
- Context of use

Questionnaire architects

- Understanding designer‘s POV
- Find relevant guidelines

Questionnaire users

- Get information about stress perception
- Thermic, acoustic, visual, air quality

Phase 2

September 2020 - November 2020

Series of Workshops

- Elaboration and validation of features and functionalities
- Role of the different users in SENSHOME
- User interface drafting

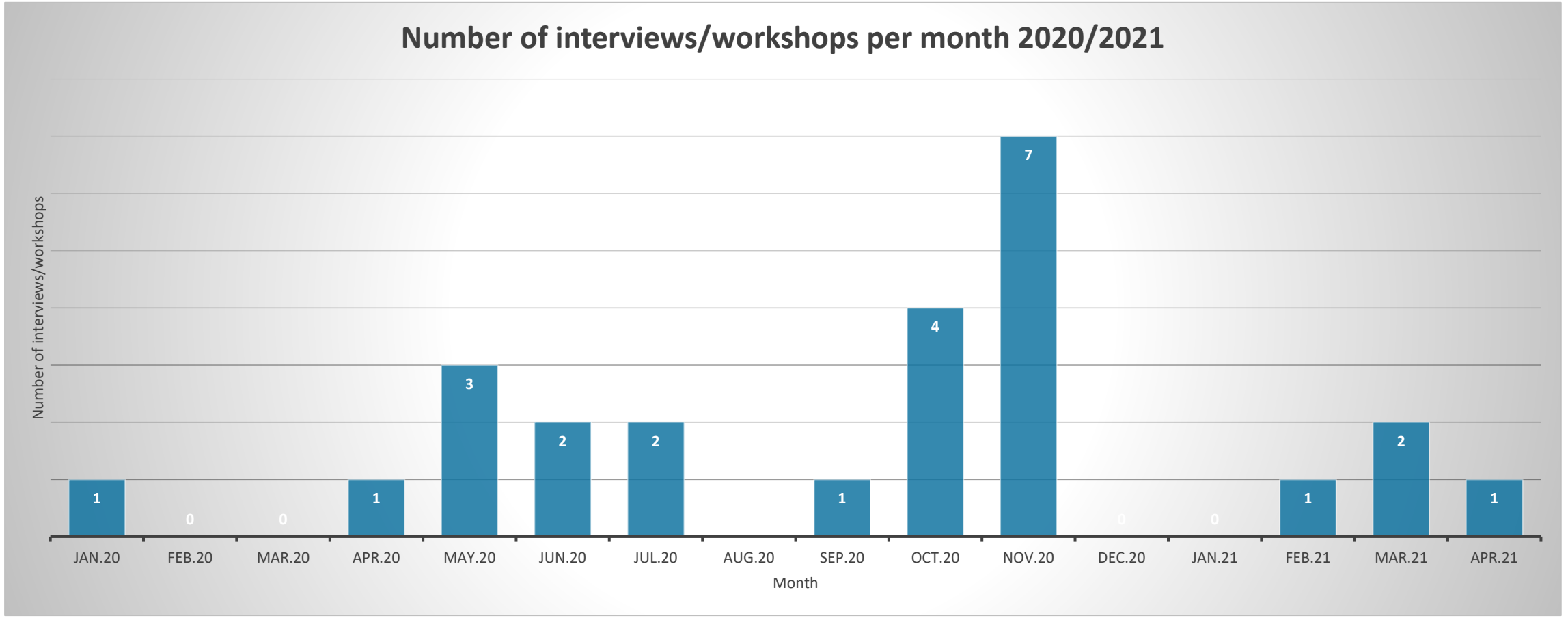
Phase 3

February 2021 - Now

Series of Workshops

- Review on planned SENSHOME furnishing

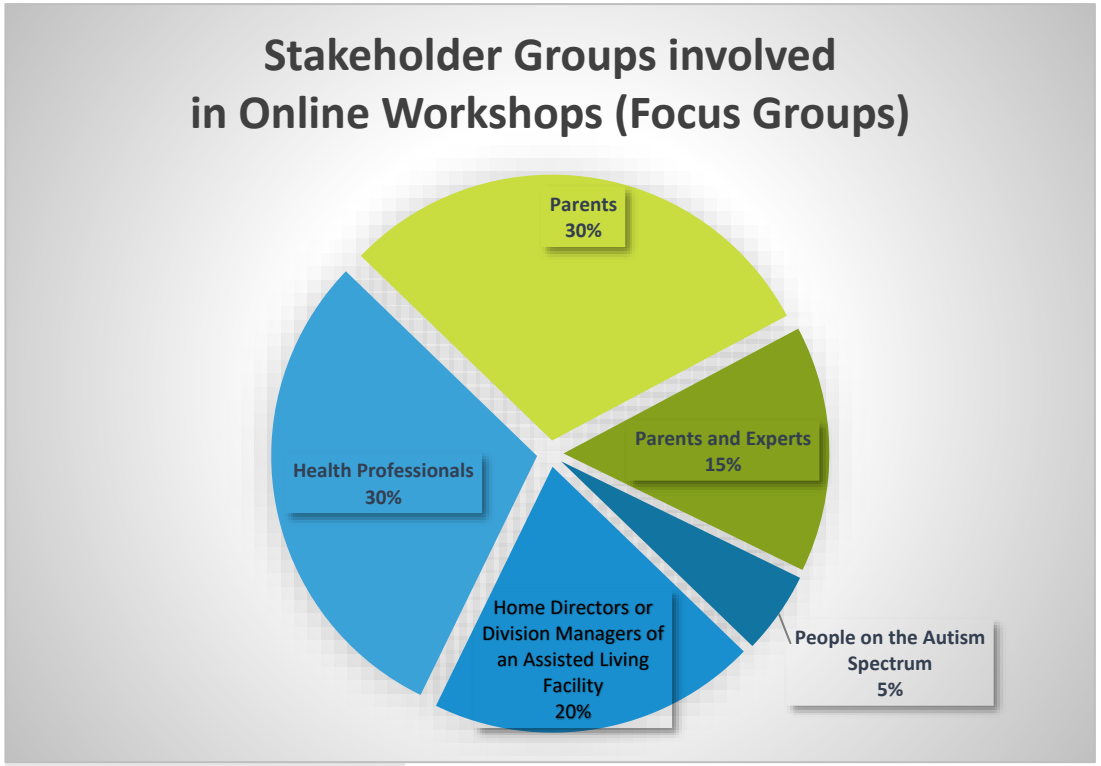
Number of interviews/workshops



DETAILS ON USED METHODS IN SENSHOME

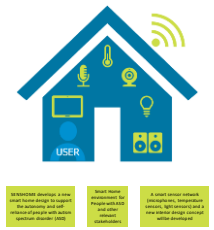
Interviews/Workshops

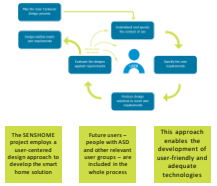
- Workshops were carried out online
- Mural, an interactive whiteboard, was used
- In total 25 online workshops in Austria and Italy



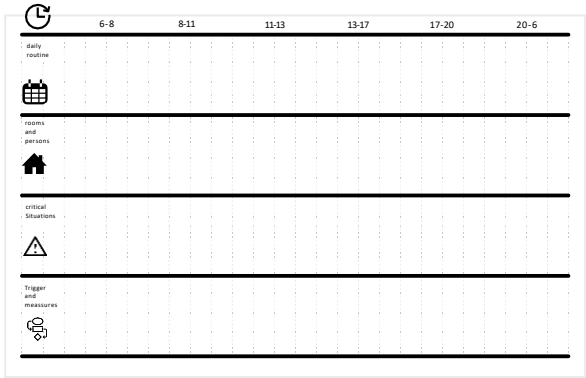
Italy	10
Austria	15

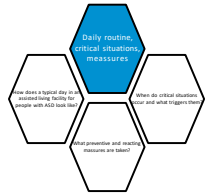
Introduction





ADL and Trigger

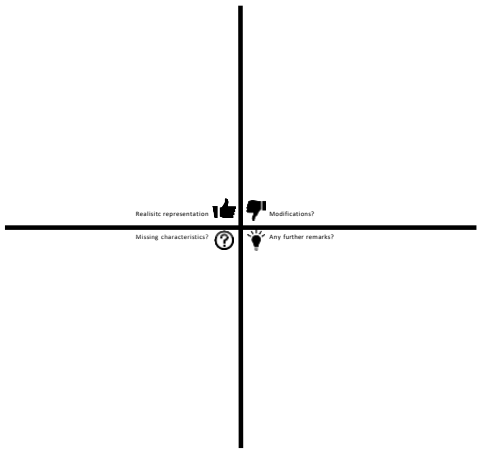


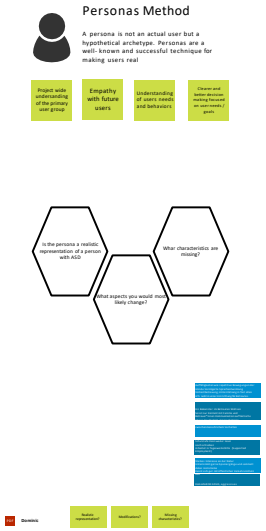


International Classification of Functioning, Disability and Health (ICF)

Do you use ICF in caring work?

Validation of Personas

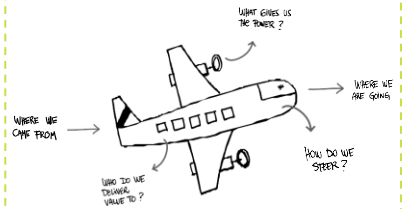




(Assistive) Technologies

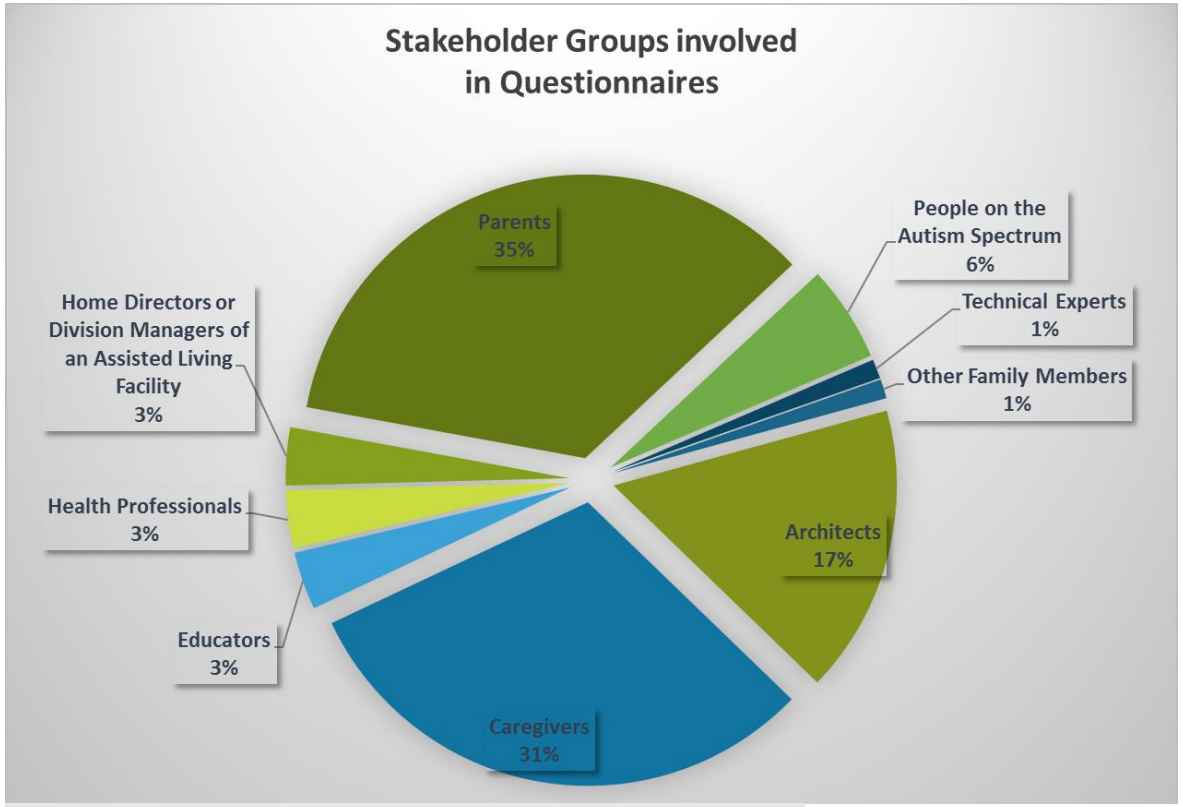
Can you tell us about experiences with technologies and people with ASD?

Thank you for participating!



Questionnaires

- Two questionnaires were sent out
- 91 answers in total
- Majority of answers from caregivers and parents

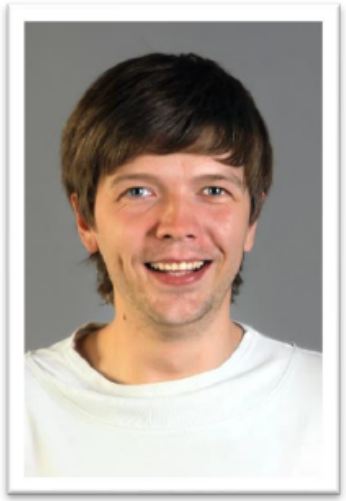


Italy	67	**USA**	2
Austria	21	**Spain**	1

Personas in SENSHOME

Standard information	Autism specific information
• Social life • Education/occupation • Interests	• Autism spectrum • Care needs • Comorbidities • Assistance • Communication skills

DOMINIC



Age 35

Residence Assisted Living

Region Carinthia

Severity of autism

low — high

Care needs

low — high

Communication skills

low — high

Autism spectrum and care needs

ASD

Dominic was diagnosed with autism spectrum disorder at the age of five. Prior to that, noticeable problems like repetitive motion of his hands and a delayed speech and language development were observed. Dominic needs assistance in almost all activities of daily living (ADL). For security reasons, a caregiver must be present 24 hours a day. Single activities he can perform autonomously (eating prepared meals, dressing, using the toilet). Daily routines are very important for Dominic.

Social life and communication

Dominic has one person from the assisted living facility he shares interests with. Other than that, he only has social contacts with the caregivers from the assisted living facility and with his family, which he meets regularly. His communication skills are very limited, he only communicates on factual level. He can barely express his needs and has massive issues with interpersonal contact and the interpretation of nonverbal signals.

Education and occupation

Dominic attended a special education school until ninth grade. He is neither able to write nor to read. Currently he is engaged in a supported employment close to the assisted living facility where he lives. He is working in a workshop where he is doing manual work. He enjoys hand-crafting wood and is also very skilled in that particular field. An apprenticeship as a carpenter was not possible due to his autism spectrum disorder.

Interests

He is highly interested in nature, especially in forests where he also likes to go for walks and collect limbs of trees or cones, which he can use and work with in the supported employment. Furthermore, he is well versed in public transport vehicles like busses and memorized many timetables. He would like to use public transport alone, what is not possible for him because of his autism spectrum disorder.

Comorbidities and other symptoms

Dominic suffers from attention deficit hyperactivity disorder (ADHD), a common comorbidity of ASD. He also has problems switching activities. Aggressive behavior against other occurs regularly that is mainly triggered by interrupted daily routines, when his needs are not satisfied or when he feels overcharged. It is very important for Dominic to have the same daily routine every day.

Needs

Through his deficits in communication, he wishes that his needs are understood better and quicker. Dominic would like to spend more time alone in his room because he enjoys the silence. Due to his aggressive behavior, that can be avoided by detecting preliminary signs, the time that he can spend alone is very limited.

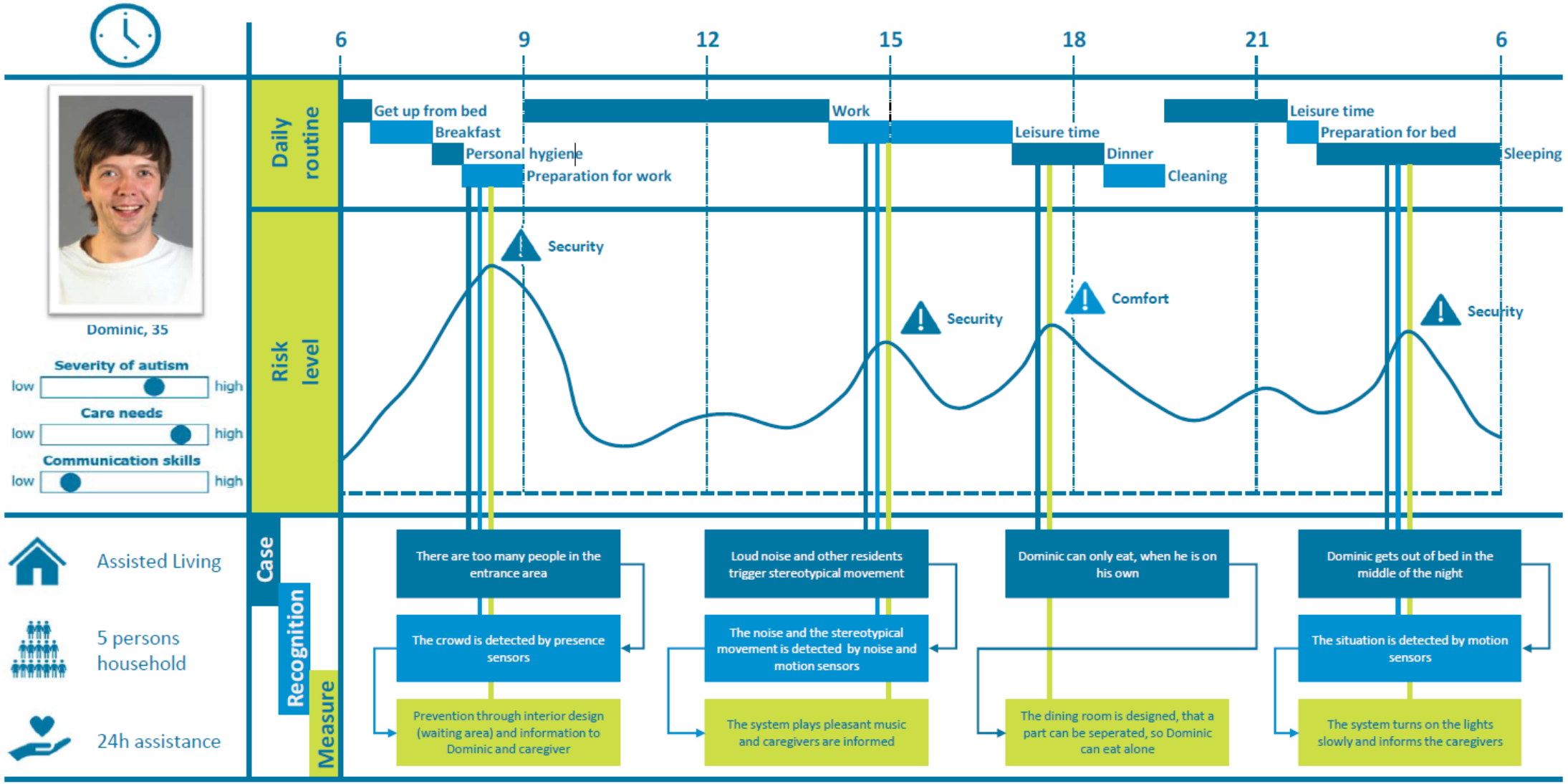
Assistance

SENS HOME

Before aggressive behavior occurs, there are preliminary signs that indicate this behavior. As an example, stereotypical movements of arms or swaying back and forth with the upper body can be detected. If these signs are recognized, caregivers can be informed.

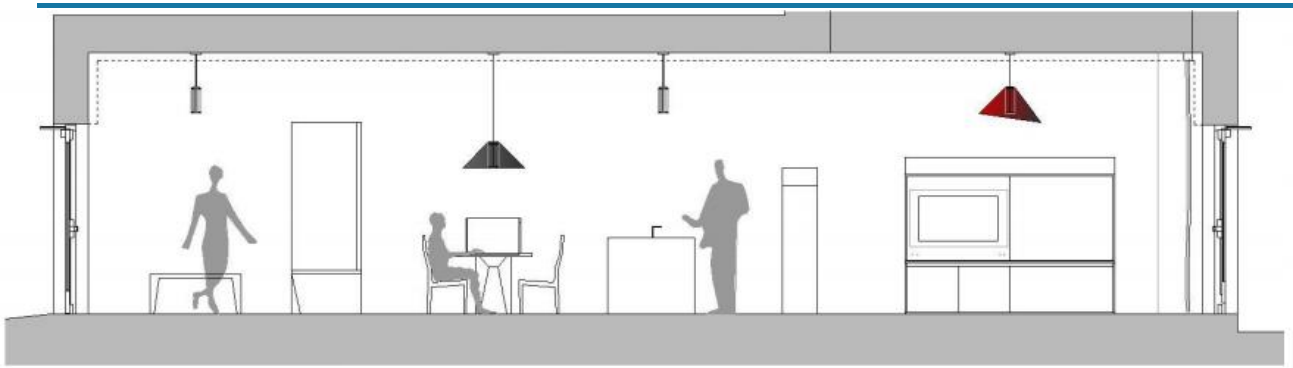
User Days

- Everyday situations and routines
- Stories about a persona who will use a future technical solution in a special situation
- The future SENSHOME system embedded in the ecosystem of the daily living of primary and secondary end-users

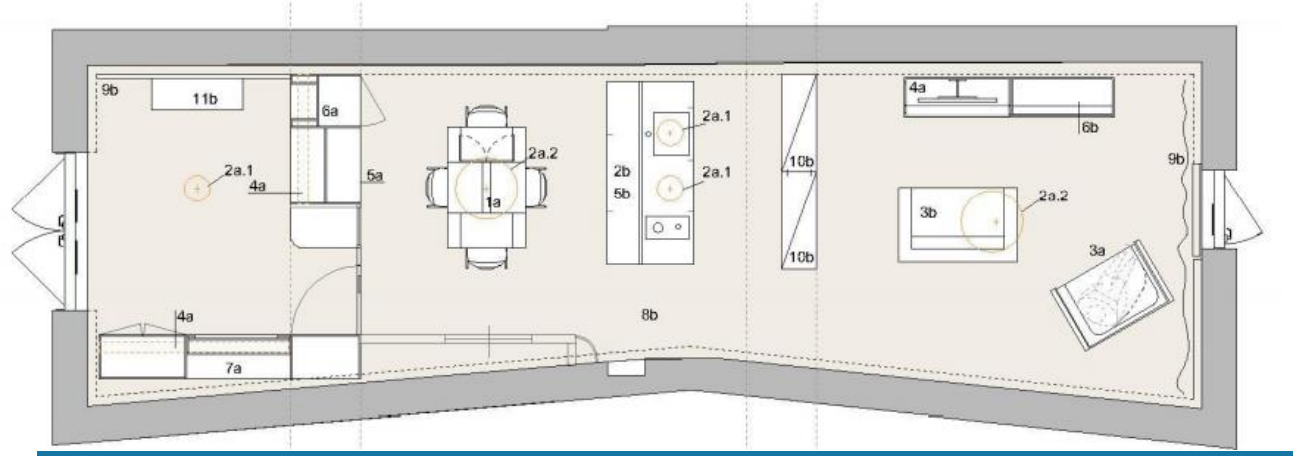

6
9
12
15
18
21
6
Daily routine
Get up from bed
Breakfast
Personal hygiene
Preparation for work
Work
Leisure time
Dinner
Cleaning
Leisure time
Preparation for bed
Sleeping
Risk level
Security
Security
Comfort
Security
Dominic, 35
Severity of autism
low
high
Care needs
low
high
Communication skills
low
high
Assisted Living
5 persons household
24h assistance
Case
Recognition
Measure
There are too many people in the entrance area
The crowd is detected by presence sensors
Prevention through interior design (waiting area) and information to Dominic and caregiver
Loud noise and other residents trigger stereotypical movement
The noise and the stereotypical movement is detected by noise and motion sensors
The system plays pleasant music and caregivers are informed
Dominic can only eat, when he is on his own
The dining room is designed, that a part can be seperated, so Dominic can eat alone
Dominic gets out of bed in the middle of the night
The situation is detected by motion sensors
The system turns on the lights slowly and informs the caregivers

PLANNED USER TESTS IN SENSHOME

Laboratory Bolzano (UNIBZ)



SECTION OF THE SENSHOME PILOT SYSTEM



Laboratory Klagenfurt (CUAS)

SHE evaluation

Phase 1	Phase 2
• People with ASD and caregiver • Usefulness – integration in daily life, everyday utility • Design and aesthetics • Accessibility	• Caregiver • Capability of sensors • Detection of hazardous events • Testing of the user interface

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Operational activities

Philip Scharf
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Thank you for your attention

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