

Mobile App for deliberate practice

WP4 D1 Design of an application for mobile devices based on TIIM

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Lead Author: Jan-Willem van 't Klooster (University of Twente)



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Activate

Agile Competency based learning for Individuals And Teams

Deliverable 1

Contributors:

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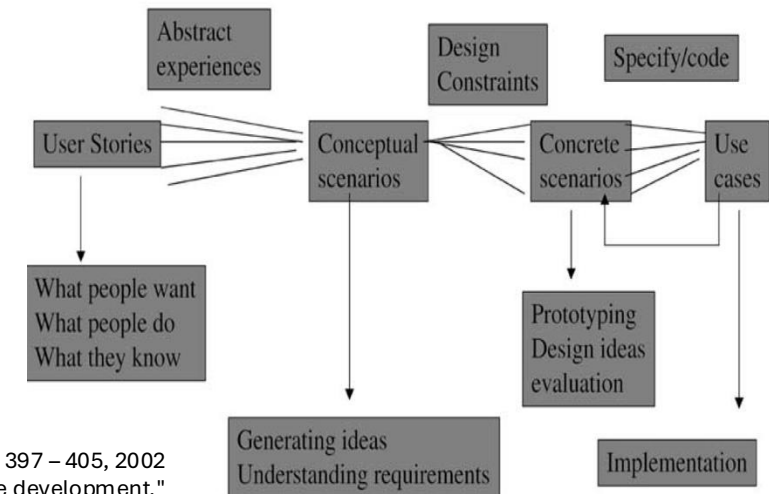
Contents

This Deliverable consists of 3 Parts and an Appendix:

1. SUNA approach: Scenario-Based User Needs Assessment.
 - Approach, Theory and an example scenario are covered.
 - This prepares the Activate working scenario (WP2 Deliverable 5)
 2. Workshop (Twente Intervention and Interaction Machine) for the Activate project, held on 3.12.2024.
 - Agenda and introduction
 - Clarification of application goals
 - Demonstration and introduction of TIIM
 - Setting up of potential scenarios for implementing TIIM in the individual deliberate practice (IDP) use case (WP2 Deliverable 6)
 - Discuss to-be-added debriefing functionality (E-portfolio) in TIIM
 3. E-portfolio Debriefing Tool addition to TIIM
 - Design, Implementation strategy, and Requirements for debriefing functionality, through setting up TIIM configuration for supporting deliberate practice in individual skill training.
- Appendix A: Scenario Theory Background

SUNA approach: Scenario-Based User Needs Assessment

- In the requirements elicitation phase of the Activate project, a scenario-based needs assessment methodology (Beynon & Macaulay, 2002; Van 't Klooster, 2012) is proposed and adopted. The goals are to gather requirements for the to-be-implemented technology in the IDP use case and to align the stakeholders on the usage scenario. A scenario describes a concrete usage of the envisioned technology in its context in a daily life setting.
- This Scenario-Based User Needs Assessment (SUNA) approach is particularly useful in multidisciplinary settings. It allows stakeholders (from all different kinds of backgrounds) to align on future work processes and technological support early in the design cycle.
- As scenarios describe concrete working examples, it becomes possible to relate to and imagine new developments and discuss implementation strategies with stakeholders.
- Various scenario types exist as illustrated in the Figure on the right. They serve different goals throughout the design process, ranging from abstract experiences to concrete use cases.
- In Activate, an example scenario is developed (see Slide 6) which serves as input to define a concrete scenario. The concrete scenario is developed afterwards in WP2 Deliverable 2.5 based on this example.



Beynon D., Macaulay C., *Scenarios and the HCI-SE design problem*, Interacting with Computers, Volume 14, pages 397 – 405, 2002
 J. -W. van 't Klooster, B. -J. van Beijnum, A. Eliens and H. Hermens, "Interactive scenario visualization for user-based service development,"
 2012 International Conference on Collaboration Technologies and Systems (CTS), Denver, CO, USA, 2012, pp. 498-503, doi:
 10.1109/CTS.2012.6261096.



Scenario content/ingredients

Background: Appendix A

Ideally, scenarios describe important and carefully crafted elements that serve the perspective of the user and the designer. These elements are shown in the table on the right.

The next slide shows the constructed example scenario and highlights the Person, Activities, Context of Use, and Technology elements in different colors.

More details on SUNA theory are given in Appendix a.

User perspective	Designer perspective
PACT approach – People – Activities – Context of use – Technology Context approach Early stages Dev. Cycle	FICS approach - Functionalities - Interactions - Content - Service System approach Later stages Dev. cycle

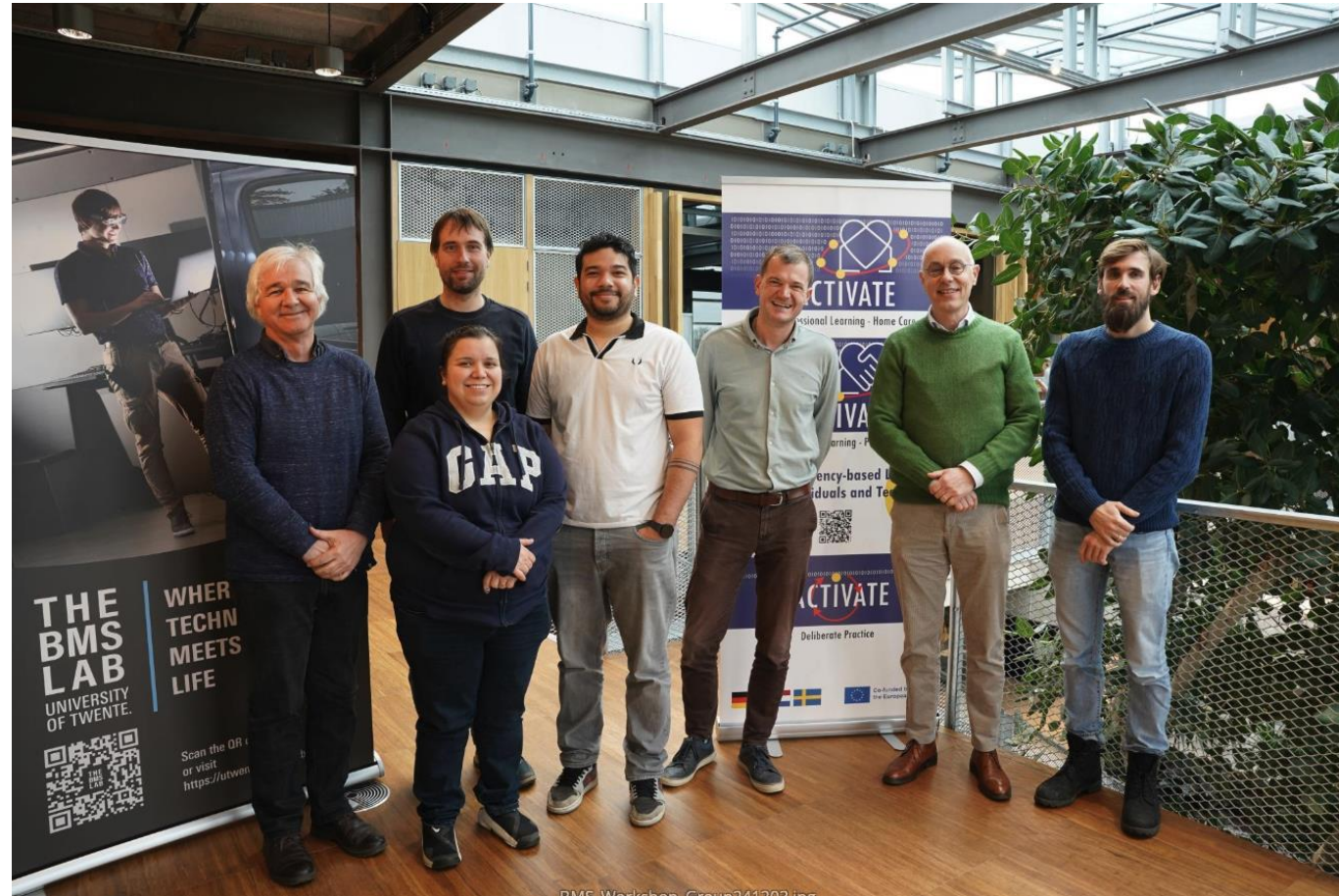
SCENARIOS –

PACT persons, activities, context, technology



- Hans is a Med school student in his second year.
- He is joining the medical examination simulation scheduled today, and are excited to train a physical examination in practice with a simulated patient.
- Beforehand, Hans and the other students are asked to think about and define self-learning goals <and enter them into their elearning app>
- <context about what is happening during the simulation>
- After the simulation session, Hans, the other students, their tutor and the simulated patients reflect. They discuss <...> using the feedback structure <...>
 - First, Hans <...>
 - Then, the simulated patient <...>
 - Finally, the tutor <...>
- The reflection is audio recorded, and then automatically transcribed to <...>
- After the reflection, Hans takes notes in his personal e-learning app to support his deliberate practice
 - First he speaks in into the app what happened, what went well, and what should be improved next practice session.
 - Then, he answers a short survey that allows him to keep track over time of his <questionnaire main constructs>
 - Finally, the app presents him his personalised self-learning goals. Hans reflects and scores them, after which the app visualises his progress.

Workshop 3.12.2024



Activate D1 - Design of an application for mobile devices based on TIIM



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Activate

Agile CompeTency based learning for IndiViduals And Teams

2024-2026

Workshop Scenarios and Tooling WP 4, 3 December 2024 | BMS Lab, University of Twente

University of Münster & University Twente

THE
BMS
LAB

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Agenda

Workshop at BMS Lab UT 3 Dec 2024

09:30-10:00 Arrival, coffee/tea

10:00-10:30 Introduction

Goals

Presentation and handout of working scenario

10:30-11:00 TIIM demo

11:00-11:15 Break

11:15-12:15 Workshop part 1 – do it yourself

12:00-13:00 Lunch

13:00-14:00 Workshop 2 and presentations

14:00-15:00 Discussion implementation, next steps, open questions

15:00-15:15 Short break

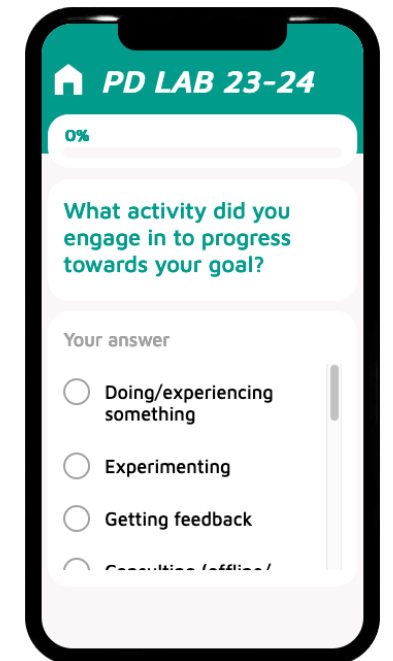
15:15-15:45 Tour BMS Lab / Discussion WP leaders

15:45-16:00 End



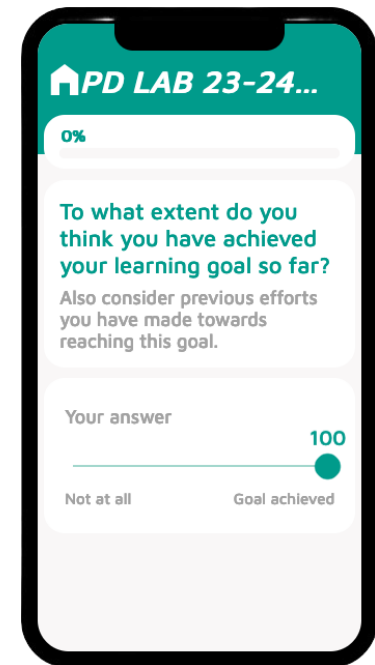
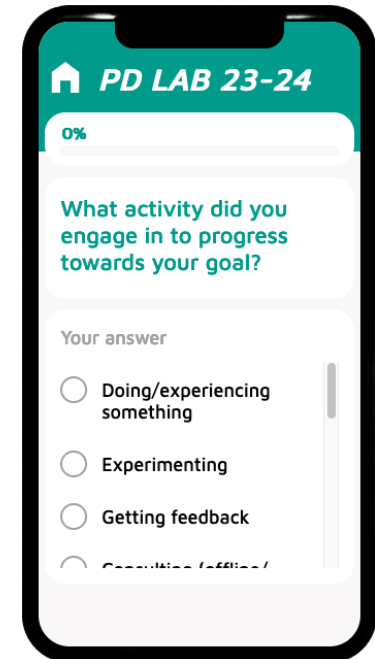
Goals

- D 4.1:
- An application for mobile devices based on TIIM with a content structure developed in WP2 to support discussions in an 'educational alliance' of learners and trainers in individual skills training.
- To this end:
- Day-in-the-life-of Scenarios have been developed
 - handed out during workshop and will be explained
- This workshop addresses:
 - the scenario
 - the technology
 - the potential realization of the foreseen technology envisioned in the scenario
 - Possible implementation steps
- Getting a deep understanding of the possibilities of the technology
- Discuss open questions



WP4 Strategic objectives and work implications

- SO1. Adapting and extending the Twente Intervention and Interaction Machine (**TIIM**) to create a native application for Android and iOS mobile devices (mobile App) that **supports deliberate practice** in individual skill training.
→ This implies setting up TIIM configuration, feedback and endorsement.
- SO2. Exploring and describing the best possibility of adapting **TIIM** for use as a temporary **e-portfolio** during the pilots and implementing it.
→ This implies conducting research, a pilot, the work for SO1, view rendering, and describing it.
- SO3. Adapting and extending the **ScriBe** qualitative data analysis software to transcribe, partition and label narrative feedback (using AI-based Speech to Text (STT)) based on the coding scheme provided by WP2.
→ This implies providing STT API service within Scribe, collaboration and execution.
- SO4. Integrating the outcome of the transcribed discussions between the student and the coach into the e-portfolio for individual skills training.
→ This implies providing the e-portfolio (SO2) with accurate content, alignment, and defining API definitions.
- SO5. Exploring the possibility of using the AI for speech transcription and analysis for team debriefing after IPT training, so that the data generated can be used for the 'debriefing dashboard' (WP5).
→ This implies defining API definitions. It will be covered later.
- SO6. Technical software testing of software for transcribing, segmenting and labelling narrative feedback, the mobile application for deliberate practice in individual skills training, and its temporary e-portfolio.
→ This implies software testing and reporting. There should also be testing in an educational setting.



Other questions to address :

- Stakeholder involvement: *(Comment from Project leader to Thematic Core Teams based on the content review of the German Academic Exchange Service)*
It is important to pay proper attention to the feedback recorded in the initial review of the project application. Stakeholders need to be involved in the further need analysis. This is among others achieved through the involvement of end users (e.g. in online meetings 6.11.2024 and 3.12.2024), the co-creation of scenarios with stakeholders using a user-centred design approach, and in a later stage using usability testing.
It is important to think about what qualitative and quantitative performance indicators are put up for the use and dissemination of our deliverables, and what the plan is to get the result sustainable and structural in education.
- How can portfolio be included in the learning management system?
- API connectivity: how should the connectivity between the systems within Activate look like?
- Legal aspects, including GDPR and privacy policies.

Summary recap from project plan

- Objectives: What do you want to achieve by implementing the project?
- Europe's demographic trends require a workforce that can cope with an aging population with multimorbidity of chronic diseases. This requires health professions education that supports lifelong and interprofessional team learning with innovative pedagogies & technologies.
- However, skills labs or workplaces often lack essential conditions for individual, deliberate practice and interprofessional learning. Digital transformation and related research are needed to empower a future-proof workforce.
- Implementation: What activities are you going to implement?
- The strategic partnership will develop simulation scenarios for individual skills training and interprofessional collaboration in home and palliative care, as well as a mobile application for narrative feedback and a shared debriefing dashboard for interprofessional team training.
The training scenarios and digital and AI technologies will be piloted and researched in health professions education with students of medicine, nursing, occupational therapy and pharmacy in both Germany and Sweden.
- Results: What project results and other outcomes do you expect your project to have?
- Results will be: training scenarios, learning materials and guides, a mobile application with AI for getting and giving feedback, a debriefing dashboard, and scholarly publications on pilot implementations. These results will stimulate innovative learning and teaching practices in which individual health professionals engage more in deliberate practice and multi-professional teams learn to acquire the competencies for team-based patient care and move beyond single professional approaches.

Deliberate practice in Health Professional Education



- Deliberate practice: A model of expertise development
 - Assumes that competence improvement is a concentrated effort based on key elements:
 - a focussed well-defined task,
 - detailed and immediate feedback and
 - opportunities to improve through repetition
- Competency-based learning (CBL) in skills labs (training with simulated authentic tasks)
- Deliberate practice supported by a coach who frequently observes the learner's activities, gives feedback and sets challenging but realistic next goals with the learner.
- Need for user-friendly digital tools that record the spoken word and automatically transcribe its content into a digital portfolio, where it is tagged with scientifically sound coding mechanisms (instead of long lists)
- Coding schemes to assess its quality.
- A feasible and practicable teacher professionalization program

What is Narrative Feedback?

A **written description** of a student's performance, **organized** in logical order to illustrate the "**story**" or **account** of a student's ***progress and performance***, including strengths **and** areas for improvement...to guide future efforts.

Demonstration and introduction of TIIM

TIIM

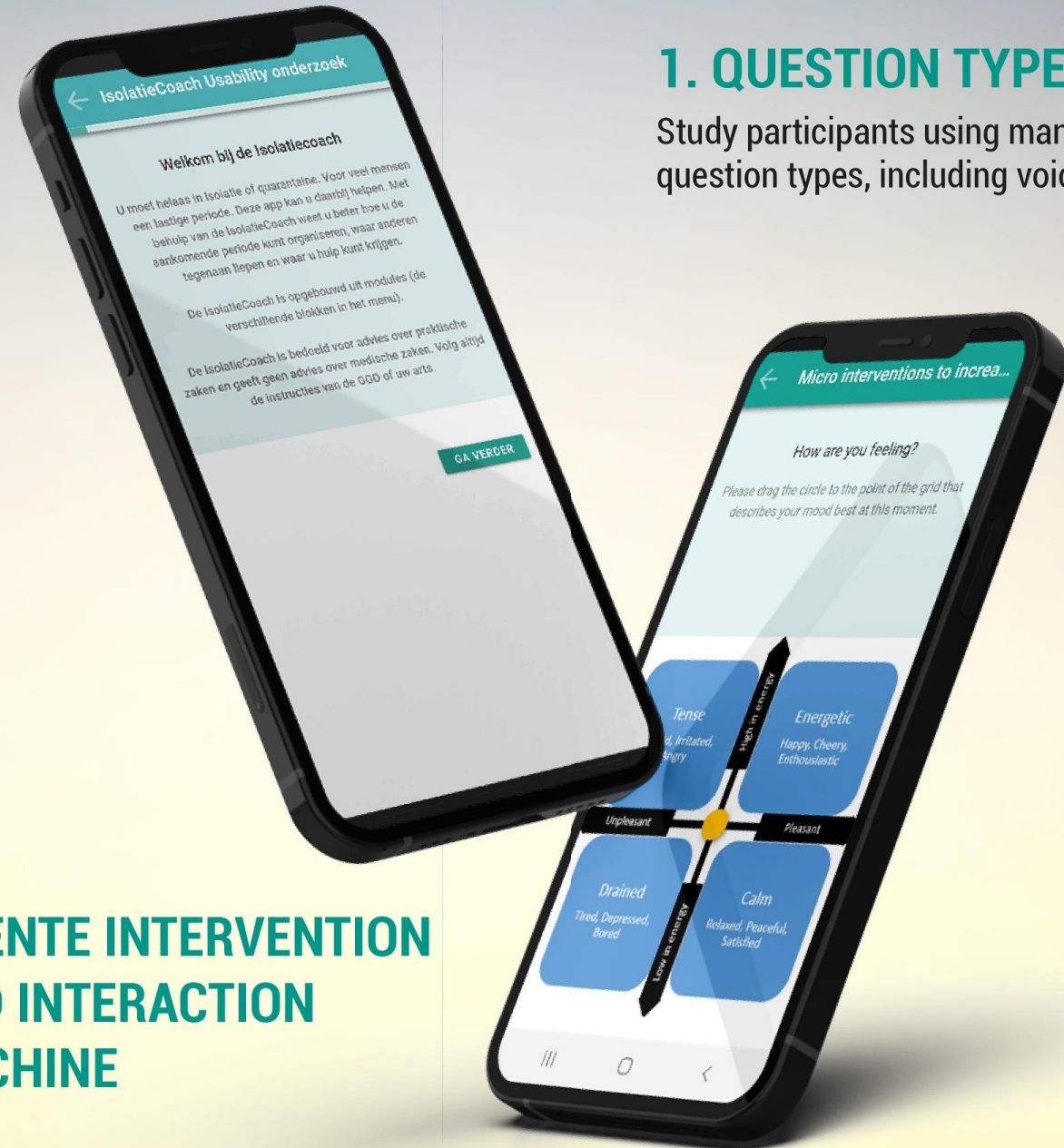
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TWENTE INTERVENTION AND INTERACTION MACHINE

Activate D4.1 - Design of an application for mobile devices
based on TIIM

1. QUESTION TYPES

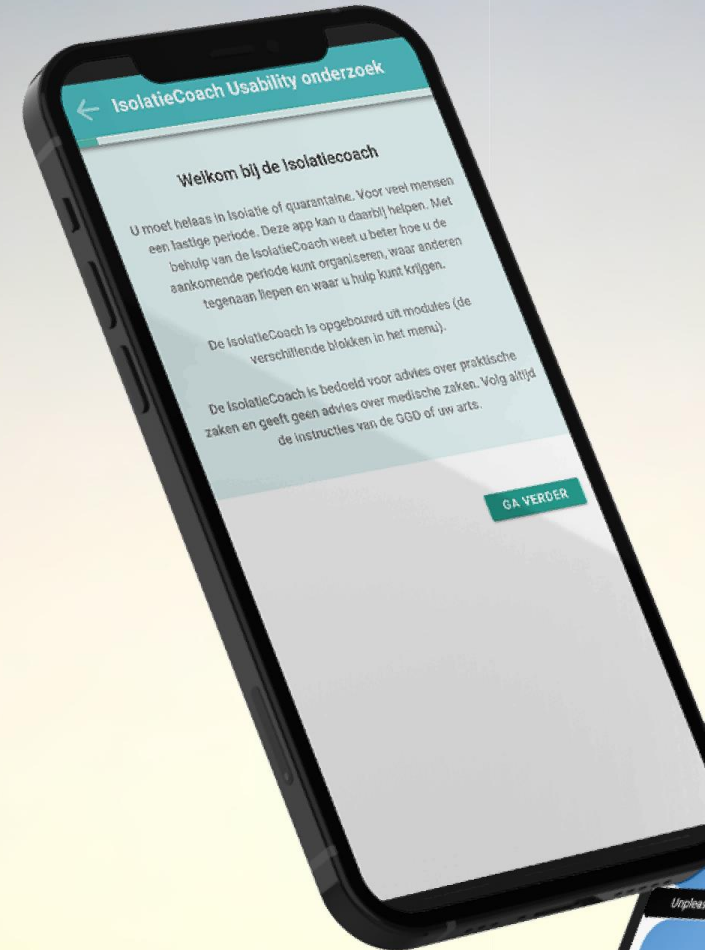
Study participants using many different
question types, including voice!



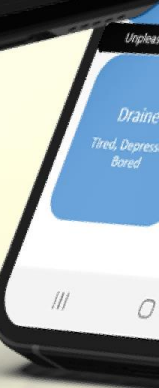
TIIM usages:

Mobile questionnaires
Cohort studies
eCoaching
Interventions
Experience sampling
EMA/EMI
Pilot testing
Clinimetrics
Wearable data
Clinical Trials
Education & eLearning

Apple Health & Google Fit compatible

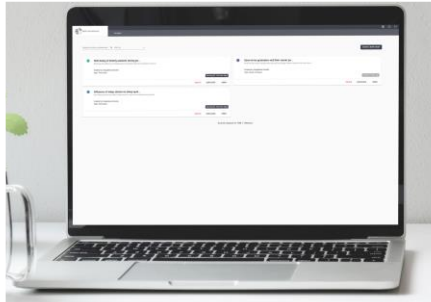


**TWENTE INTERVENTION
AND INTERACTION
MACHINE**

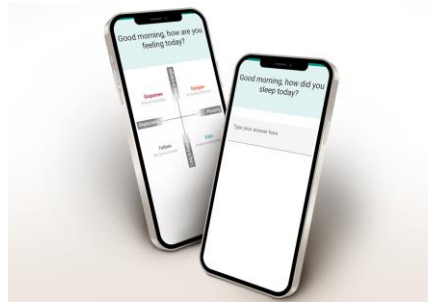


Two sides of TIIM

Researcher/clinician - dashboard



Participant/patient - mobile app



Helpdesk, tutorials, e-learning and support available

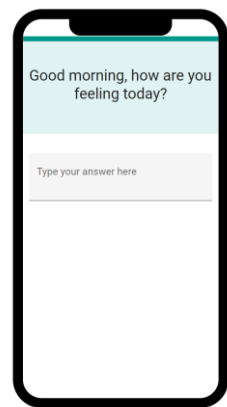
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Push notifications for participants



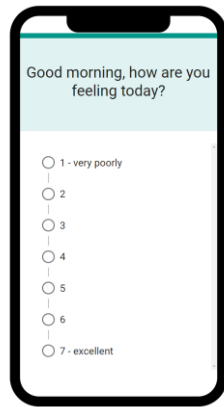
14

Multiple question types



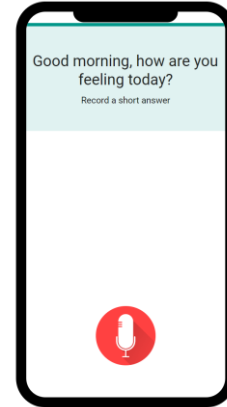
Text

Free or structured options



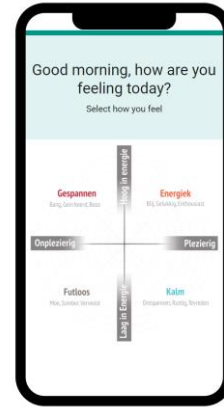
Numbers

Multiple input options



Recordings

Photos or audio

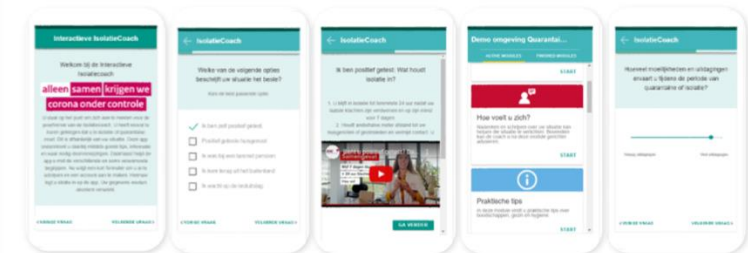
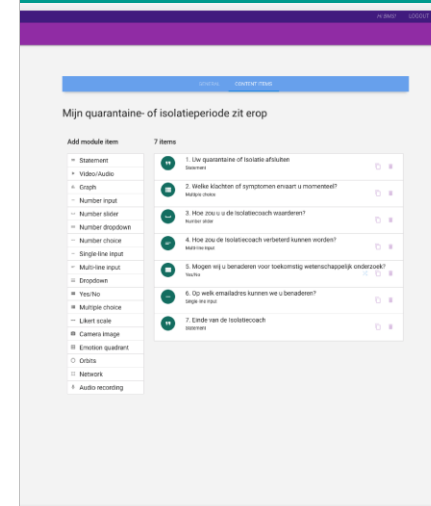


Graphs

Interactive visuals

12

age



ISO/NEN 7510/7512/7513 proof
GDPR & ISO/IEC27001 compliant

A micro-figurational approach
to the social context
of Internet of Things skills
and digital inequalities

← Zie Promotiekalender

Quantified eCoaching for Resilience Training

Combining self-tracking and persuasive eCoaching to train employees' capacity for resilience: identification of values and requirements with stakeholders



Aniek Lentferink is a researcher at the Hanzé University of Applied Sciences, the research group Personalised Digital Health and the research group New Business & ICT, and at the University of Twente, the Centre for eHealth and Wellbeing Research. Her PhD research aimed to identify values and requirements for combining self-tracking and persuasive eCoaching for resilience training among employees. The combination of self-tracking and persuasive eCoaching is seen as a promising approach to stimulate the self-management of users. In current eHealth technologies, the combination is not optimally designed to make use of its full potential. State-of-the-art knowledge can improve the future design and, indirectly, contribute to a healthier and happier working population. Important pillars during the project were the involvement of key stakeholders and business modeling.

She applied several methods (to scoping review, interviews, focus groups, prototype testing, surveys, and log data) to identify how self-tracking and eCoaching should be designed to positively influence employees' capacity for resilience, the usability of the design and adherence to the intended use. This thesis contributes to the body of knowledge of behaviour change via technology and has practical value for the design of eHealth technology for resilience training.

Her research interests include participatory development of eHealth, quantified self and persuasive design to stimulate positive behaviour change via technology.



Quantified eCoaching for Resilience Training

Combining self-tracking and persuasive eCoaching to train employees' capacity for resilience: identification of values and requirements with stakeholders

Anas Lanthieria



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admin@utwente.nl

Dashboard

CodeBooks

About

Settings

Logout

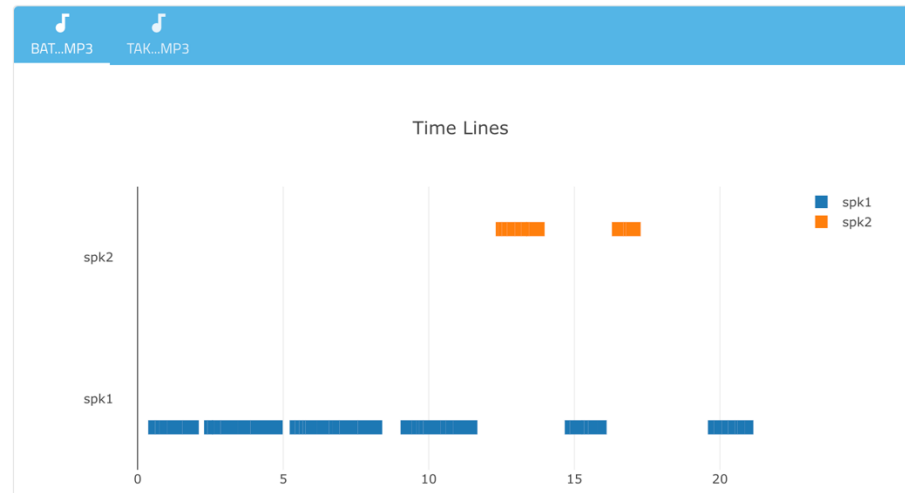
Test Analysis

Download the table as a csv file

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▶ 0:00 / 0:22 — 🔊 ⋮



+ add a column

START	END	asd (Duration) 🗑	asd (Speaker) 🗑	asd (Words) 🗑
00:00:00	00:00:11	10.26	Speaker 1	Now for high altitude jumps, you're going to need oxygen and stabilizers. Now I'm going to say, compared to your usual requests jumping out of an airplane, it's pretty straightforward.
00:00:12	00:00:13	1.68	Speaker 2	Now, what about getting back into the plane?
00:00:14	00:00:16	1.44	Speaker 1	I'd recommend a good travel agent.
00:00:16	00:00:17	0.99	Speaker 2	Without it landing.
00:00:19	00:00:21	1.56	Speaker 1	Now that's more like it, Mr. Wayne.

Records per page: 10 ▾ 1-5 of 5



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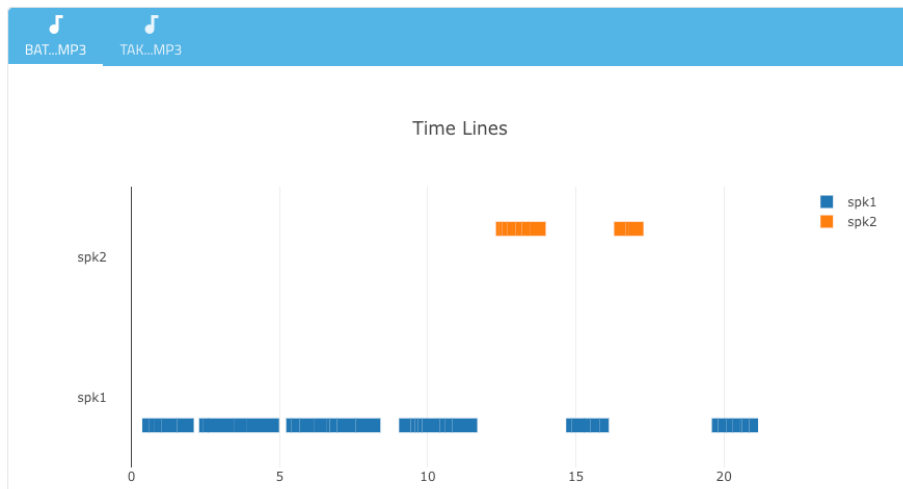
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00:00:00	00:00:11	10.26	Speaker 1	Now for high altitude jumps, you're going to need oxygen and stabilizers. Now I'm going to say, compared to your usual requests jumping out of an airplane, it's pretty straightforward.	code1 code2 code3
00:00:12	00:00:13	1.68	Speaker 2	Now, what about getting back into the plane?	code6 code3
00:00:14	00:00:16	1.44	Speaker 1	I'd recommend a good travel agent.	code8
00:00:16	00:00:17	0.99	Speaker 2	Without it landing.	code5 code4
00:00:19	00:00:21	1.56	Speaker 1	Now that's more like it, Mr. Wayne.	code4

Records per page: 10 1-5 of 5

Deliverables

- D1. An **application** for mobile devices based on TIIM with a content structure developed in WP2 to support discussions in an 'educational alliance' of learners and trainers in individual skills training.
- D2. A software application based on ScriBe to automatically transcribe, partition and label speech recorded with mobile devices during feedback discussions in individual skills training and with recording devices in (research and) debriefing facilities for IPE.
- D3. **API interfaces** for data communication between the mobile application for individual learning and essential other services.
- D4. **Test reports** that help stakeholders understand the quality and status of the software being developed.
- D5. **Technical documentation** of the software developed.

Interlink with Activate WPs

- Discussing the user stories from Münster to support the software development (WP2)
 - Establishment of communication channel and 'rhythm'
- Usability study (WP6, implementation research)
 - Building on our earlier US studies, including qualitative and quantitative measures
- Contribute to coding scheme (WP6)
- Help evaluate debriefing dashboard tool IPT (WP5, w. orebro)
- API interface alignment TiIM $\leftrightarrow$ ScriBe and ScriBe $\leftrightarrow$ dashboard for IPT training (Leipzig)
- General management, dissemination, valorisation, consortium meetings
- Kick-off 17 and 18 October.

E-portfolio Debriefing Tool addition to TIIM

Setting up TIIM configuration for supporting deliberate practice in individual skill training.

Context & Preparation

- Members of the University of Twente and Münster University collaborated to develop a scenario for using the application in IDP student training. After defining the scenario, multiple potential use cases for the app in different scenarios were identified. With further collaboration, the scenarios and options were elaborated and one was chosen to be followed.
- The chosen use case of TIIM was based on minimal interference of the app within the sessions (i.e., one phone with the app, used by one student) and minimal set up required (one large study for all students), and after the session, the usage of e-portfolio for review purposes.
- Based on the selected use case of TIIM and the E-portfolio, outlined on the next slides is the proposal for the development approach. It is split in three phases and includes the initial designs and technical requirements.

Development plan

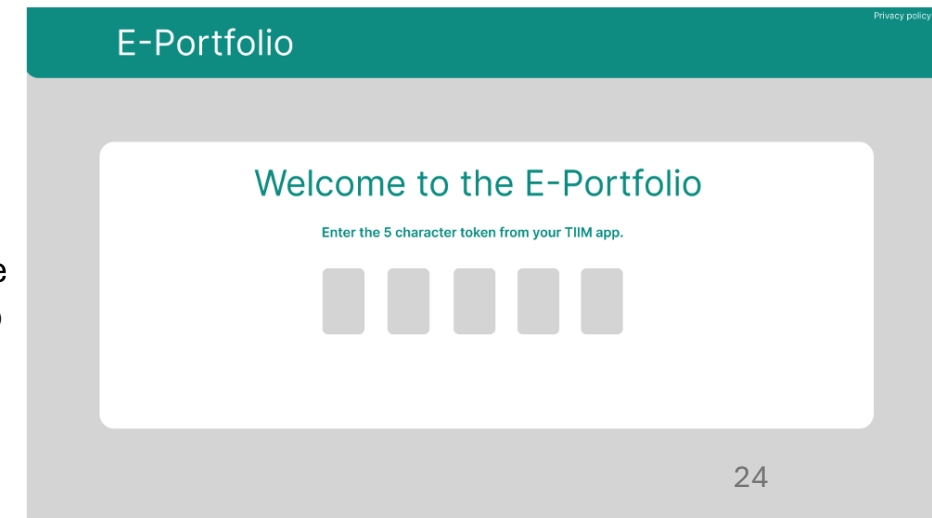


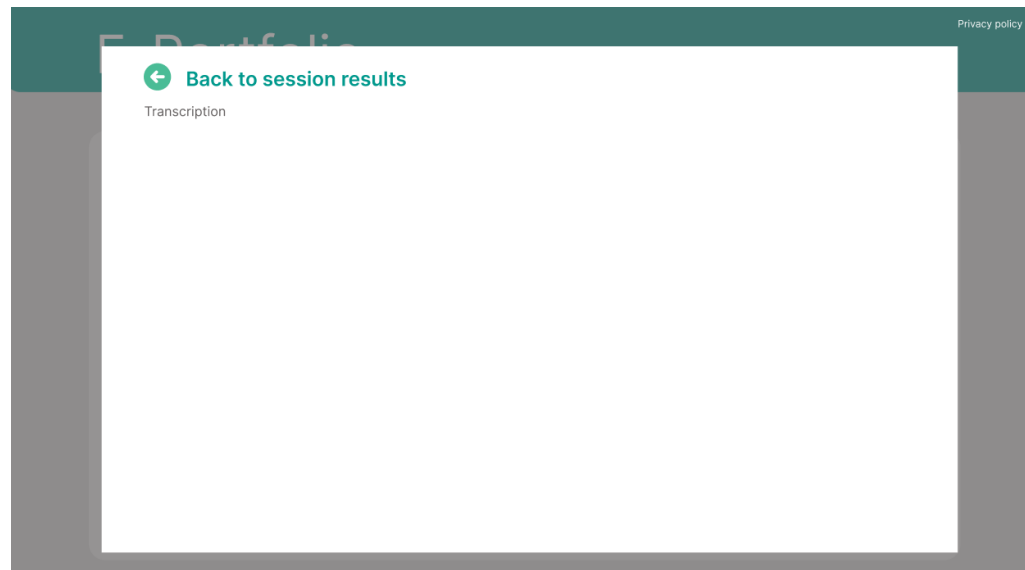
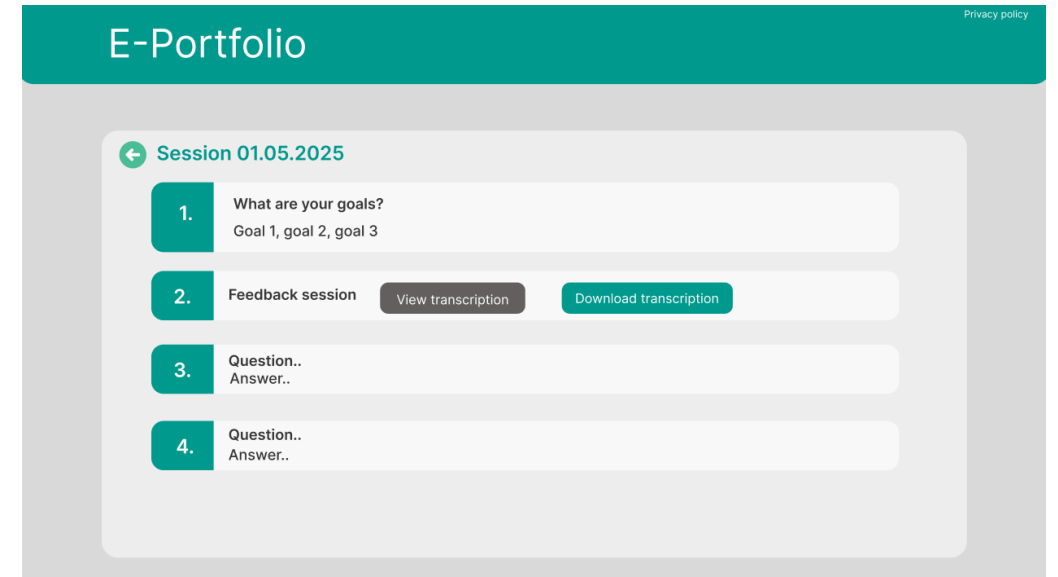
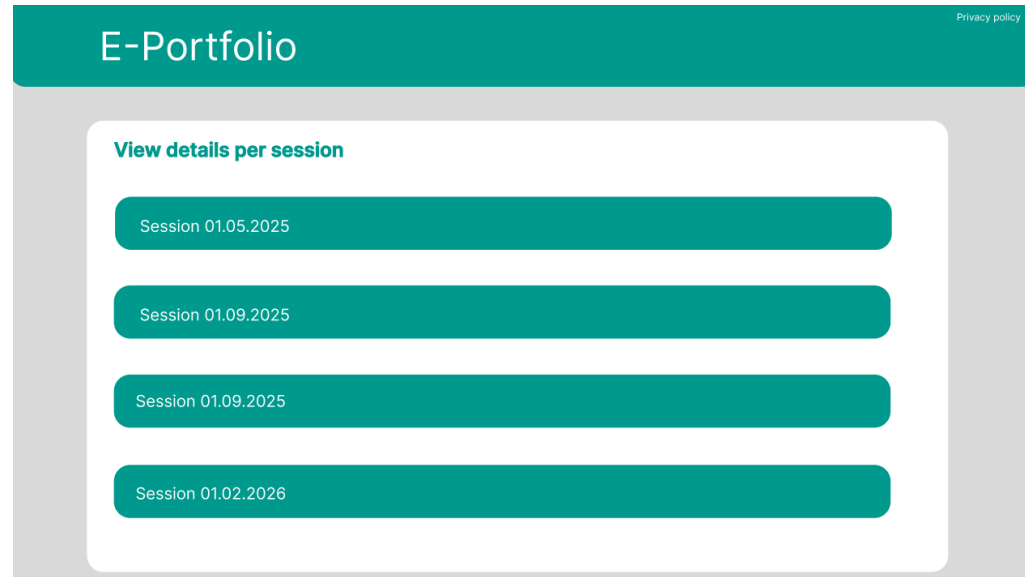
Given that the e-portfolio consists of a to-be-built addition to TIIM, a development process is started to realize it. This will be followed by the implementation of an on-demand module, with the project concluding by addressing the smaller improvements to the TIIM app, particularly in handling audio files. Through the whole development, attention will be paid on the stability and scalability of the studies in TIIM.

E-portfolio

- Separate web page that contains all feedback information of the student and transcripts from the sessions
- Sending the link with via email, token will expire after 7 days. Only the student will be able to see this token within the app, and to access the app they may choose to use biometric log in.
- A landing page to add token in the E-portfolio will need to be created
- Ability to get and share access to this custom dashboard from app (used in the desktop but built in the app project file)

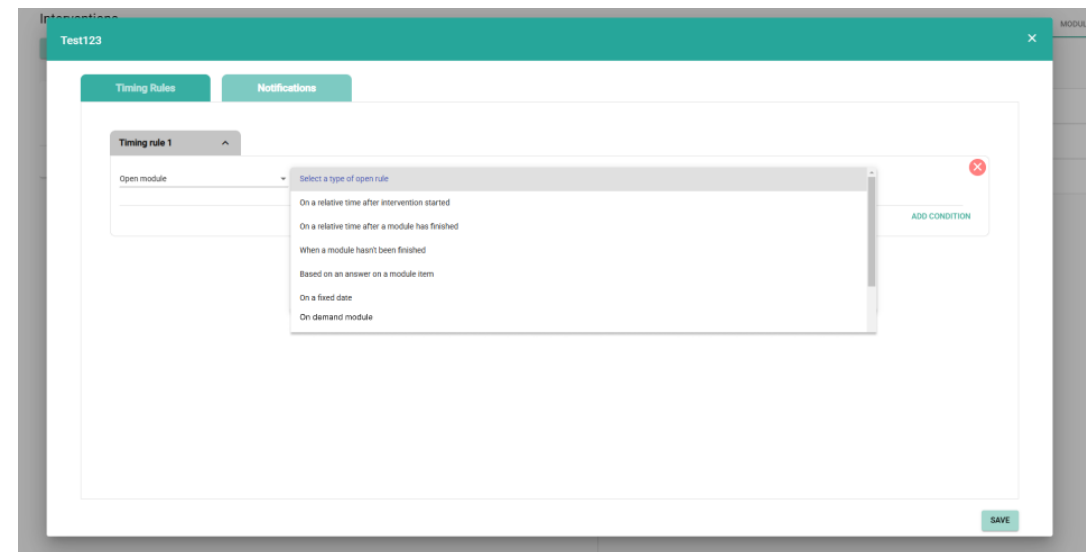
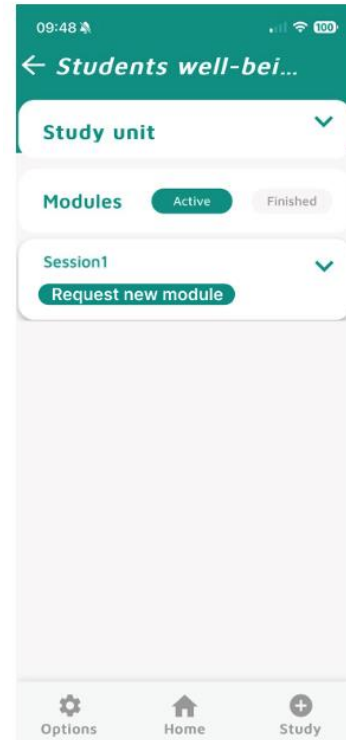
We believe that the following design allows for flexibility when it comes to the displaying the different study sessions and questions; while, at the same time, keeps the design similar to the app, avoiding a learning curve when it comes to use.



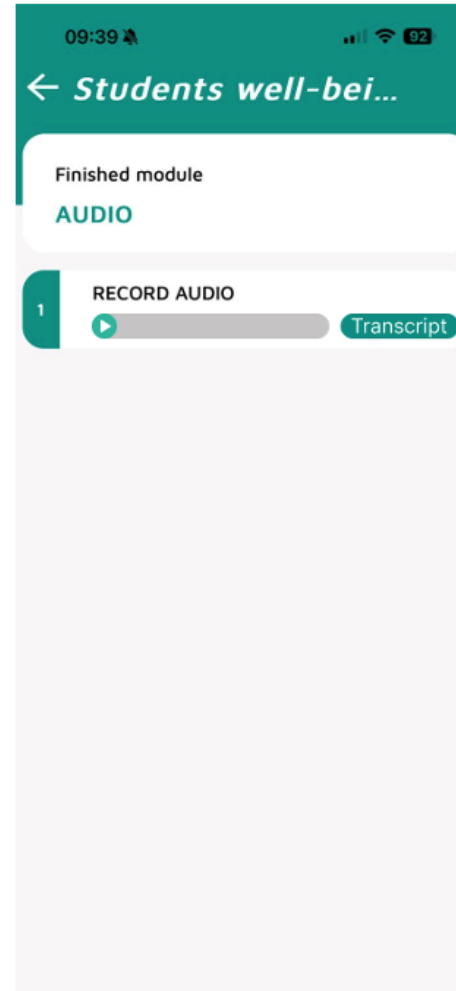
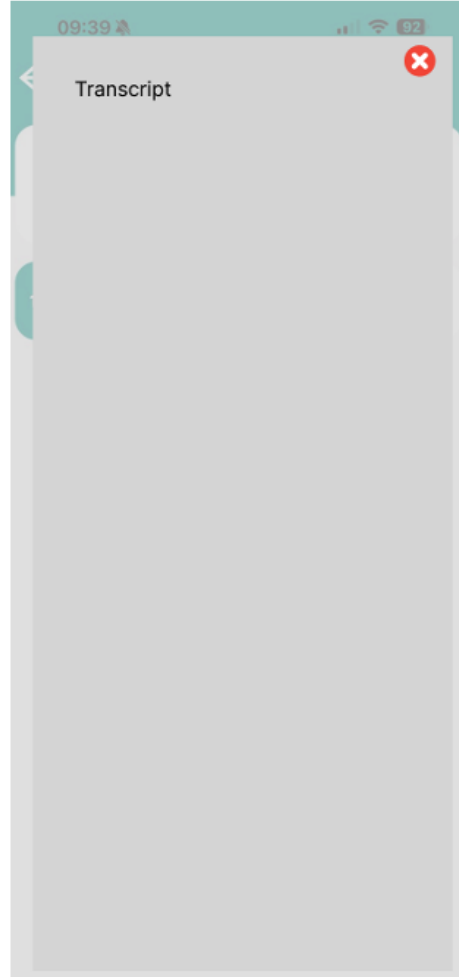
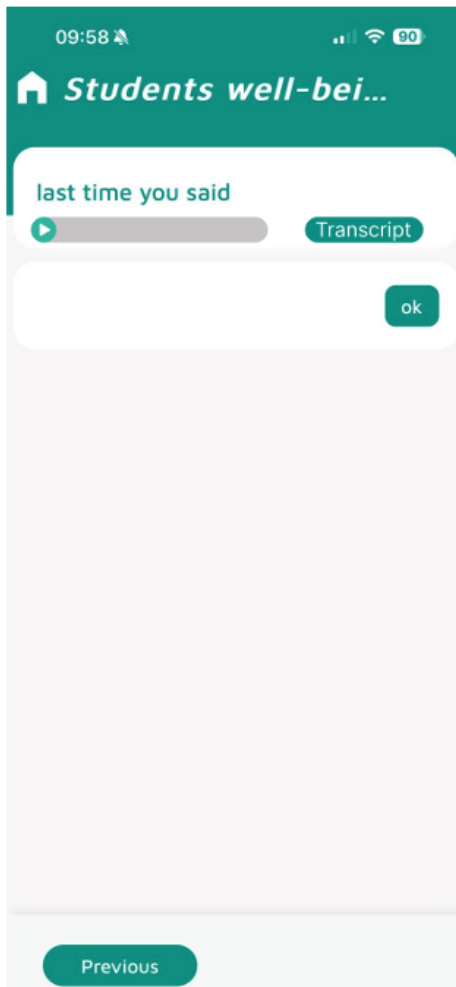


On-demand Module

- Adjusting the current timing rules to allow a module to reopen once it has been answered, based on a trigger initiated by the participant. This adjustment will enable participants to revisit and complete the same module multiple times as needed, providing greater flexibility in study design.
- Creating a button in the study in the app that calls for a new module to open.
- In metrics, to have a tag to differentiate it from the other modules, similarly to the Experience Sampling (ESM) module.
- Adjustment to the metrics and to the download to allow for the new rule (with the possibility that not all participants will have the same number of modules answered).
- Using this timing rule cannot be done together with other.



Audio files handling



- Adjustments to dynamic text to allow for audio files, transcripts
- Allow audio to be listened from the module answers
- Allow transcript to be sent to TIIM (keep in mind the transcript will be quite lengthy)
- Allow transcripts to be viewed from the module answers
- The transcript will be created once the audio is saved.

Requirements

Requirement	Type	Requirement
Act-001	App	Create E-portfolio path to show answers of the participant (module answered list)
Act-002	App	Create / edit answer view of all existing module items
Act-003	App	Handle looping module in the app
Act-004	App	Show transcription of audio file and handle send request for transcribing audio files
Act-005	App	Handle request for sending emails
Act-006	App	Handle audio as dynamic text show transcription in the app
Act-007	Dashboard	Add audio answers as dynamic text
Act-008	Dashboard	Add new repeating module in timing rules
Act-009	Dashboard	Handle looping module in the metrics page
Act-010	API- transcription	Troubleshooting/discussion with Arian about storing large audio files on the server
Act-011	API - transcription	Discuss communication from API to Scribe*
Act-012	API - transcription	Create endpoint to send audio recording to Scribe
Act-013	API- transcription	Create webhook to store transcription in database
Act-014	API-eportfolio	Create endpoint to get e-portfolio data
Act-015	API -eportfolio	Create endpoint that creates a link (7 days expiration time) to the e-portfolio and sends the link in an email to the participant
Act-016	API-module	Implement on-demand / looping module
Act-017	API-module	Check/Update the triggers for opening and closing of modules and sending reminders
Act-018	API-module	Check/Update the triggers for opening and closing of modules and sending reminders
Act-019	API-module	Add to downloads (pdf, multiple csv's)
Act-020	API-other tasks	Documentation
Act-021	API-other tasks	Updating existing tests and write tests for the new parts
Act-022	API-other tasks	Meetings
Act-023	API-other tasks	Risk assessment



Activars D4.1 - Design of an application for mobile devices
based on TIIM

Appendix A

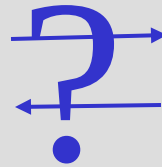
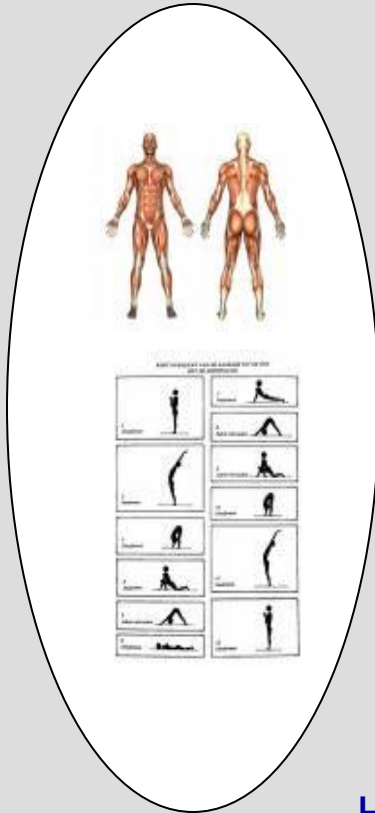
SUNA background



The next slides present background theory on SUNA approach, including:

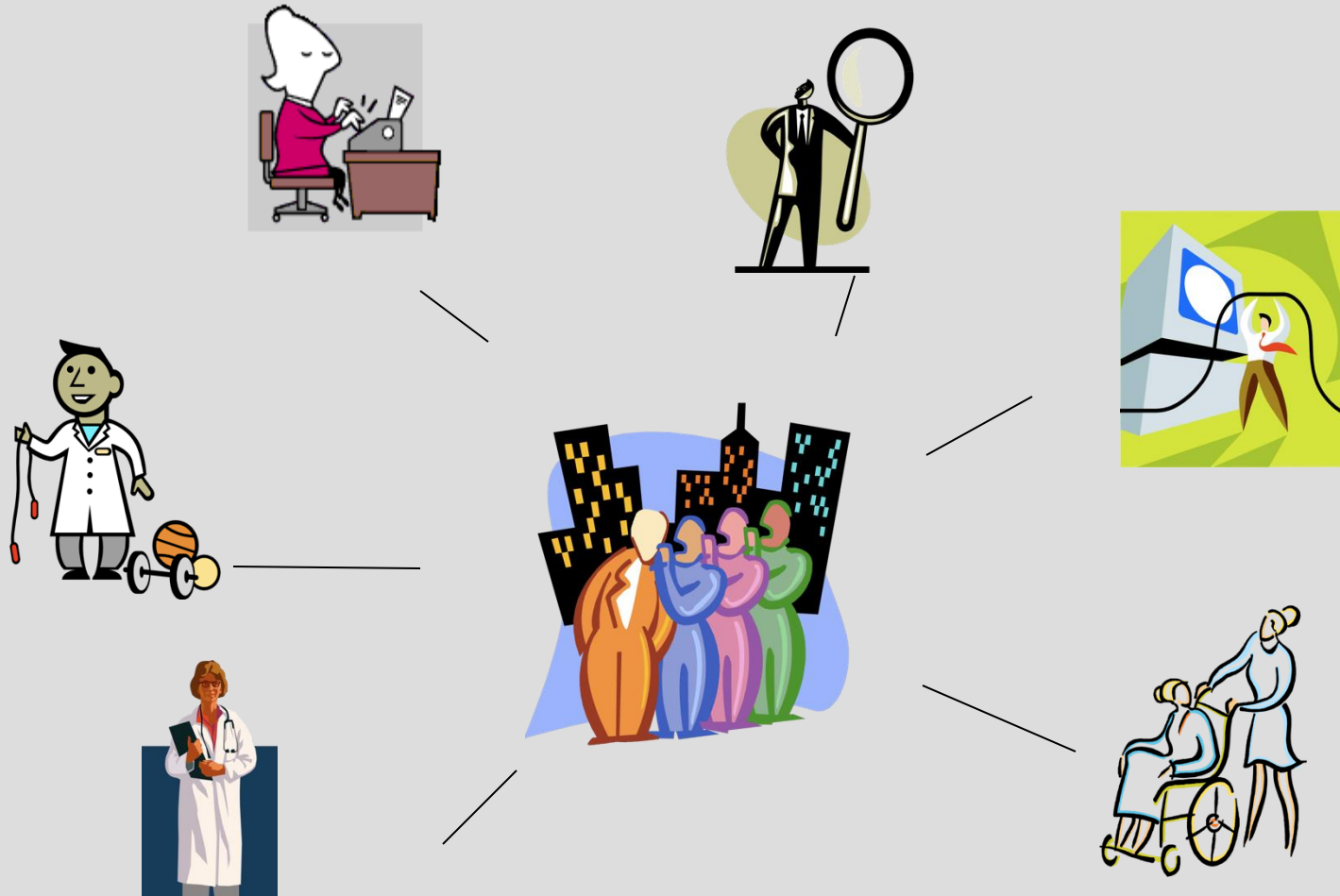
- The problem it solves & its relevance,
- How scenarios bridge gaps between stakeholders,
- Definitions and important aspects,
- Types of scenarios,
- Scenario ingredients,
- How to arrive from scenario to requirements.

Challenge in user needs assessment?

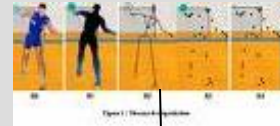


How to bridge 'gap' between clinical and technical expertise?

Designing services = multidisciplinary collaboration!



Designing services = Different levels of technical familiarity



Clinici versus Technici

***Designing services
= avoiding miscommunication!***

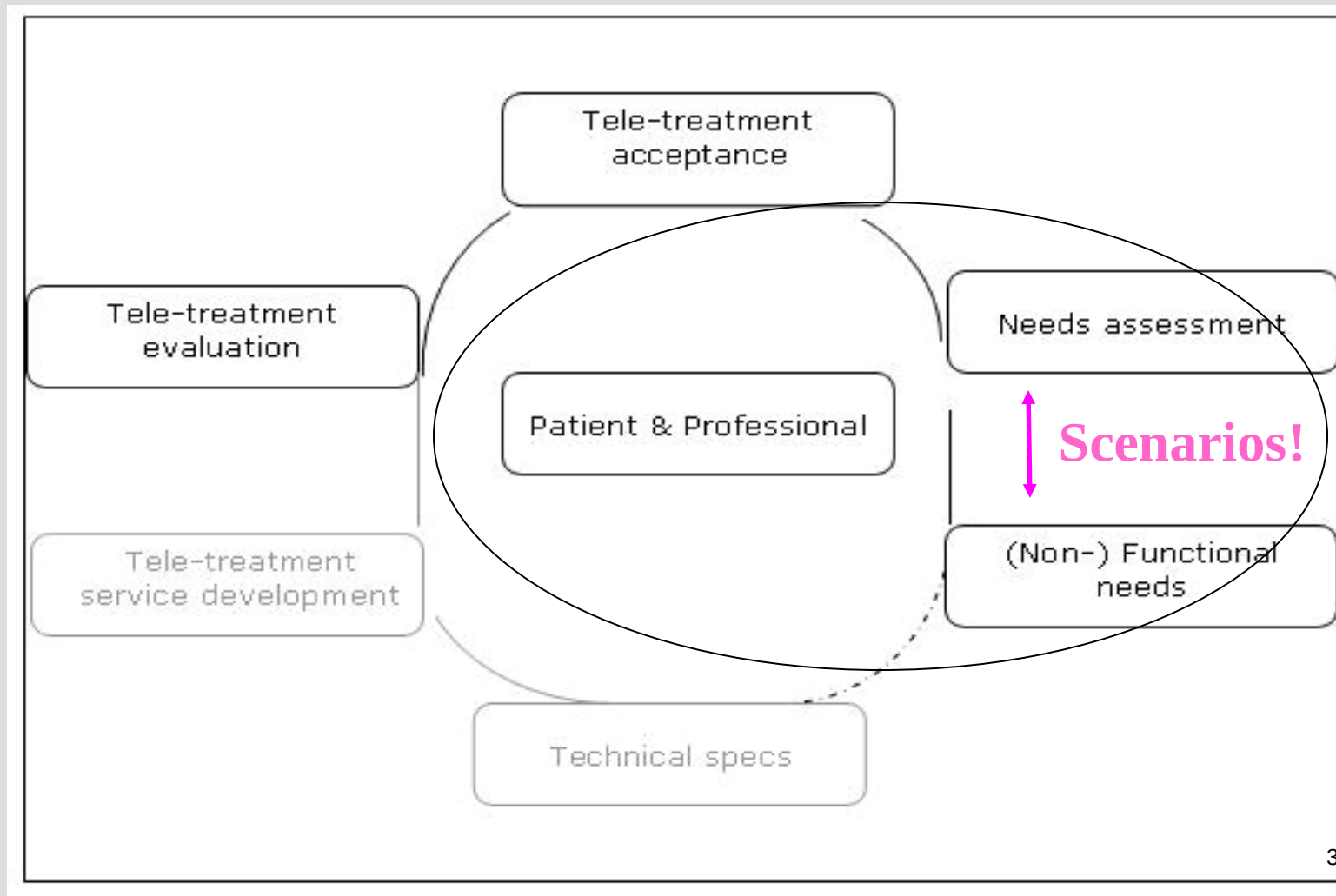
Clinicians, technicians, assessors
speak different 'languages'



Bridging the gap by means of scenarios

- **Problem: The exact end-user needs towards new technologies are difficult to retrieve**
- **Problem: Different communication language between professionals and technicians**
- ***Solution: “Tool” to support the process of telemedicine development? Scenarios!***

Development life cycle of service

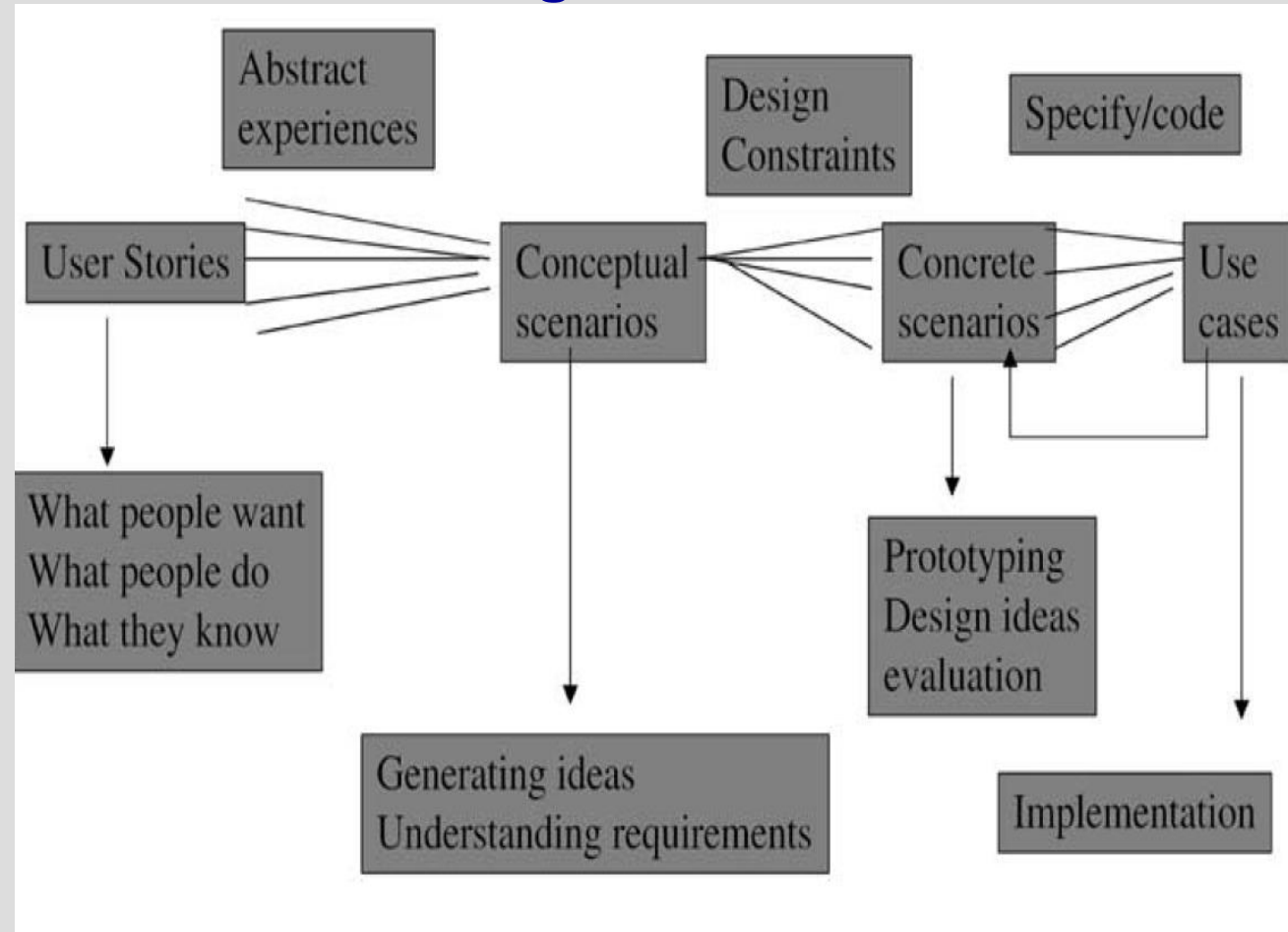


What is a Scenario?

- ***Concrete description of the use of a (future) system/technology, embedded in the professional health practice***
- ***Script in which various activities, roles and responsibilities are ascribed to both human factors and technical devices; what is expected of the technology to make things work in practice.***

Recommended reading: Carroll J.M., *Five reasons for scenario-based design*, Interacting with Computers, Volume 13, pages 43 – 60, 2000.

Usage of scenarios



Beynon D., Macaulay C., *Scenarios and the HCI-SE design problem*, Interacting with Computers, Volume 14, pages 397 – 405, 2002.

Objective of Scenarios (Jarke et al., 1999)

Scenario-construction (process): communication, evaluation and discussion tool

Scenario objective: To concretize the usage and consequences of for instance technological telemedicine systems

Scenario-product:

= (Detailed) Description of who (actor) does what (interaction & functions system) for what purpose (goal) (Kaindl 2000)

Scenario content/ingredients

User perspective	Designer perspective
PACT approach – People – Activities – Context of use – Technology Context approach Early stages Dev. Cycle	FICS approach - Functionalities - Interactions - Content - Service System approach Later stages Dev. cycle

Beynon D., Macaulay C., *Scenarios and the HCI-SE design problem*,
Interacting with Computers, Volume 14, pages 397 – 405, 2002.

‘guidelines’ on how to write a scenario

- The problem is obvious
- The user's motivation is much more clear on why to use the tele treatment service
- The feature is clear :
You know more about how the envisioned technology works in daily care
- The end-users benefit is clear
- The scenario is "end-to-end" (has a beginning and end)

Scenario example: check your PACT & FICS

Story line (=> beginning – end!)

Lisa is 35 years old **patient**. She is **working** at a large administrative company. *She suffers from neck-shoulder pain* which is, to *Lisa's opinion* related to the computerwork she performs. Because of this, she was allowed to have a **new treatment approach; the MyoTel myofeedback treatment service that allows her to be treated at the workplace without the attendance of a therapist**. By means of the MyoTel service subjects **are taught to relax their neck-shoulder muscles** (so-called trapezius muscle). Therefore, she **wears a garment** during work that **registers her muscle activation**. Every week she has a **teleconsultation** with the **myofeedback therapist** to **discuss the progress**.

Problem

“future” service

People

Roles

Activities

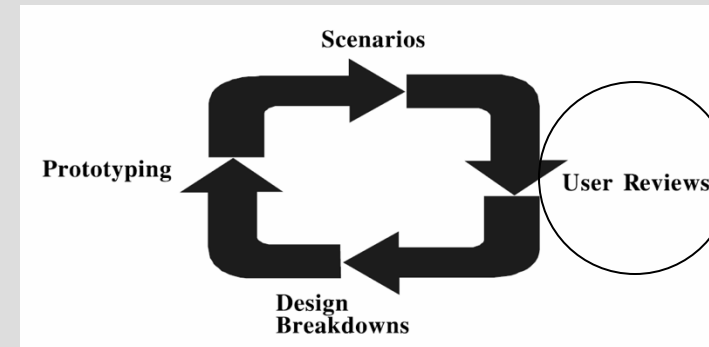
Functionalities

Interaction

Context of use

From scenarios to functional requirements: user reviews

- **Primary end-users**
 - *Patients*
 - *Therapists*
 - ...
- **System developers**
 - *Biomedical engineers*
 - *Informatical engineers*
 - ...



Beynon-Davies P., Holmes S., *Design breakdowns, scenarios and rapid application development*, Information and Software Technology, Volume 44, pages 579 – 592, 2002.

From scenarios to functional requirements: User reviews

- *Qualitatively= refine on the motivations of end-users with respect to design choices, input, possible similar innovations, test for consistency, plausibility etc.*
- *Quantitatively= if possible quantify/illustrate consequences of the innovation (type of sensors needed, amount of data to be collected, amount of data to be send)*

Concrete description functional requirements

Example of functional requirement:

‘the system should be able to register the lack of relaxation in the trapezius muscle’

Better:

‘the system should be able register the Relative Rest Time (RRT) values $< 20\%$ derived from the EMG signal of the trapezius muscle’

It is always wise to label and categorize your requirements

Prioritizing functional requirements: MoSCoW method

- ***Must have: those requirements which are critical for the service to succeed***
- ***Should have: those requirements which are not critical to success, but will lead to more chance of getting the service successful***
- ***Could have: those requirements which are less critical but are nice to have, e.g. possibly increasing satisfaction***
- ***Won't have: those requirements which are not realized now but can be used in the future***