How to create impact by means of personalised health technology

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ROESSINGH RESEARCH & DEVELOPMENT

AFFILIATED WITH UNIVERSITY OF TWENTE

Disclosure of speaker’s interests

(Potential) conflict of interest	**None**
Potentially relevant company relationships in connection with event	**Not applicable**
▪ Sponsorship or research funding ▪ Fee or other (financial) payment ▪ Shareholder ▪ Other relationship, i.e. …	Not applicable

ROESSINGH RESEARCH & DEVELOPMENT

IMPACT LAB FOR PERSONALISED HEALTH TECHNOLOGY

REHABILITATION | SPORTS | HEALTHY AGEING

Moving forward together

WITHIN THE CONTEXT OF
REHABILITATION, **SPORTS** AND **HEALTHY AGEING**

How to create **impact** by means of personalised health technology to achieve equality and inclusivity in rehabilitation care?

NavMem
Navigation Support for Older Travellers with Memory Decline

eWall
eWallproject.eu

RE-SAMPLE

Leaves

COCO

CLEAR

Human centered care

Remote monitoring and coaching

Digital transformation in health care

Self-management and patient empowerment

GezelschApp

PLAYMANCER

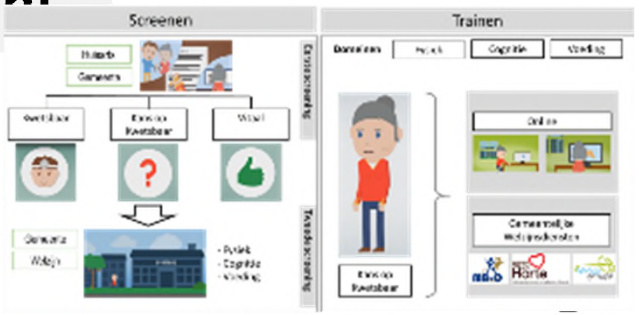
COUNCIL of COACHES

Interreg
Co-funded by the European Union
North-West Europe
Scale-Up4Rehab

backUP

SCOTTY

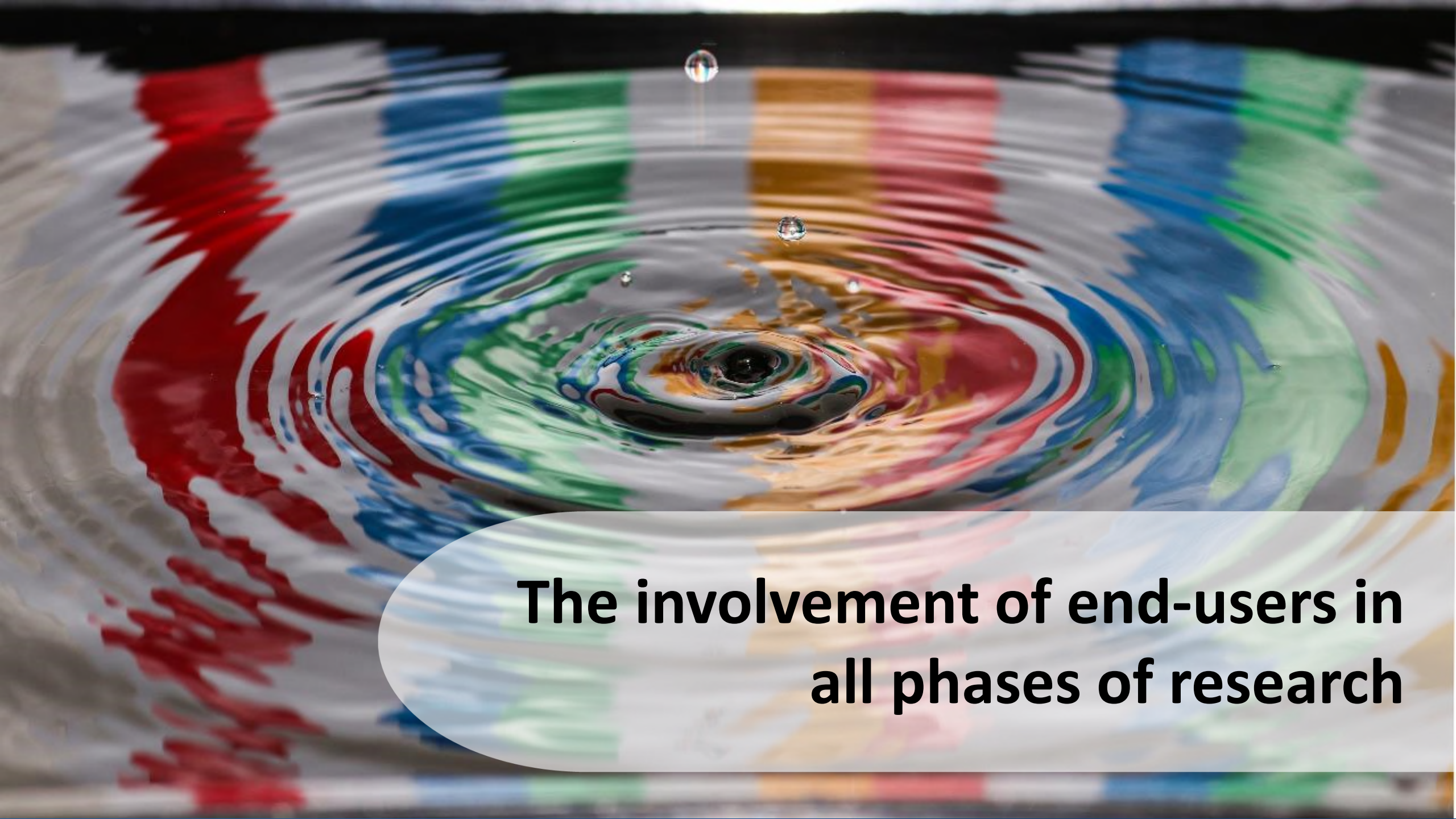
Myotel



Langgezond.nl

PERSSILAA

Who has experience with this kind of personalised health technology?

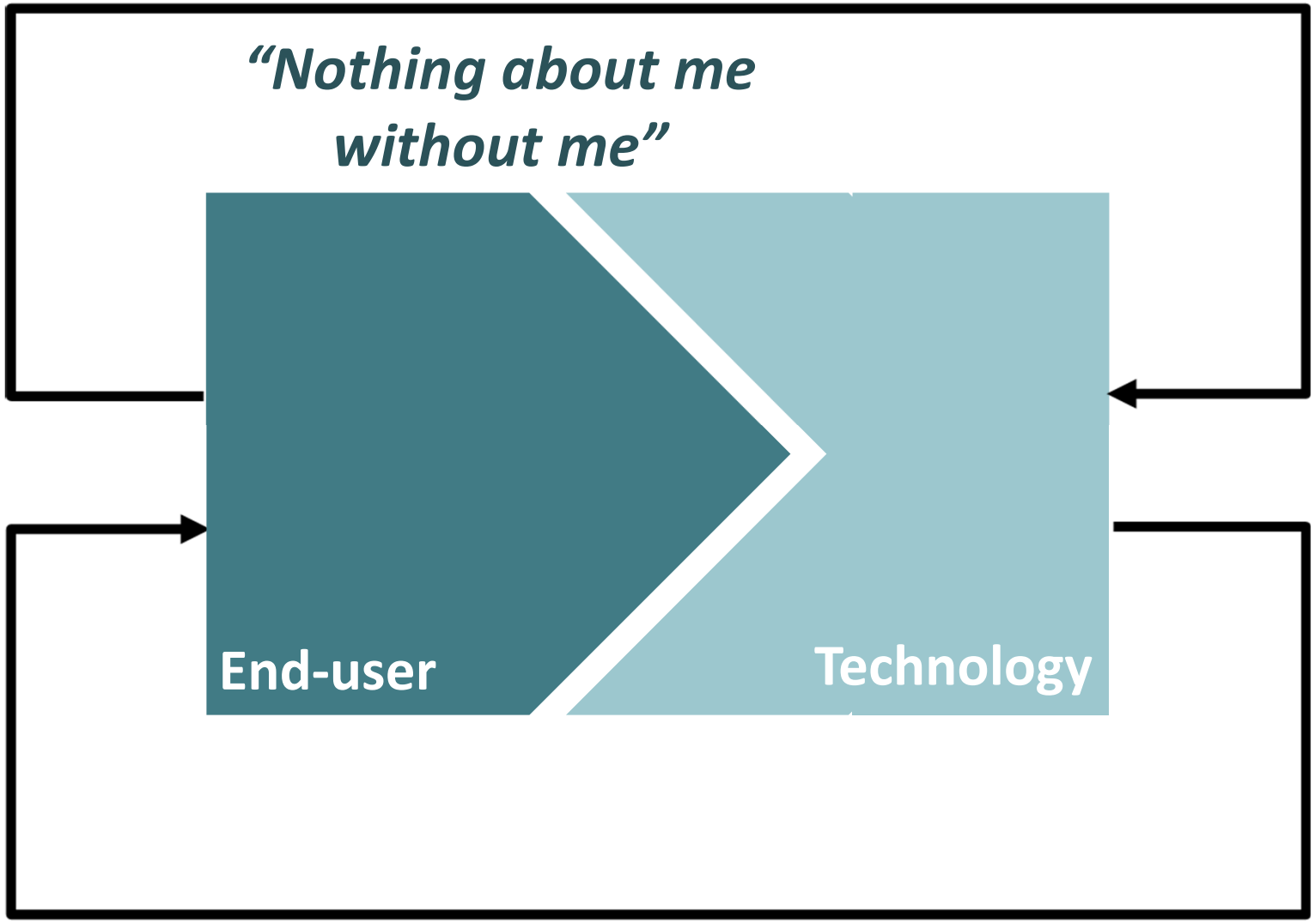


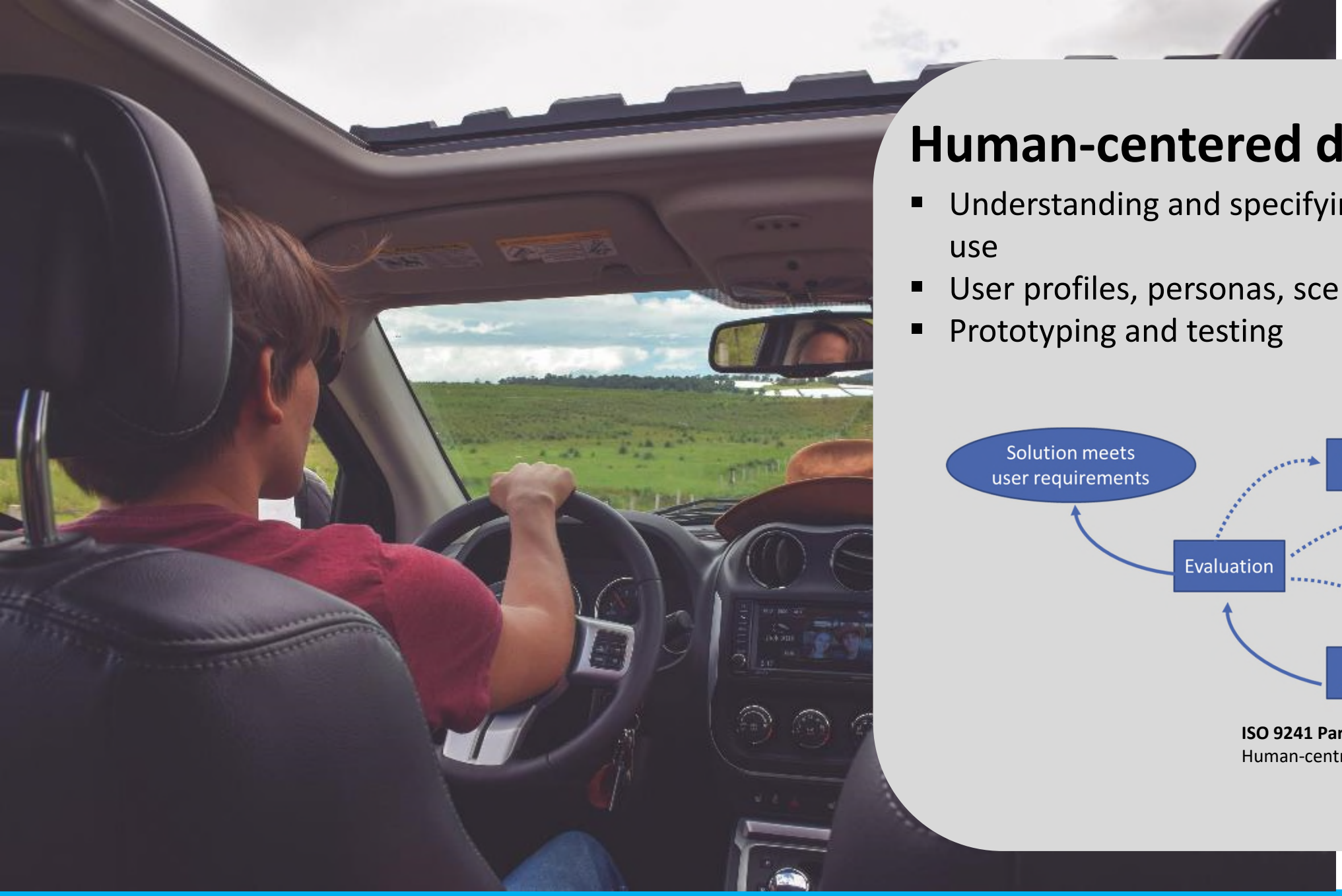
The involvement of end-users in all phases of research

Innovation

Technical
Social
Process

Participatory Approaches

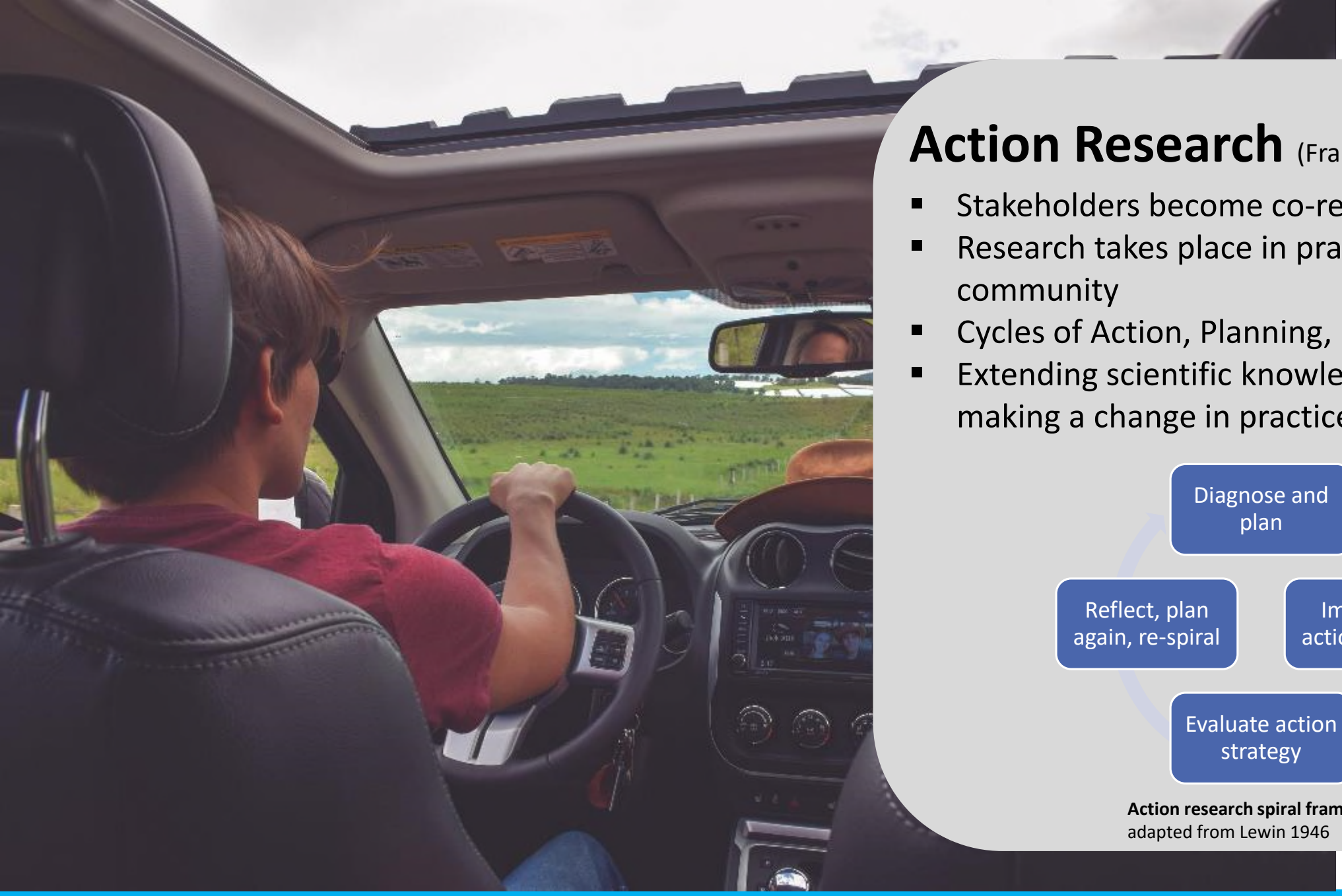




Human-centered design

- Understanding and specifying the context of use
- User profiles, personas, scenarios
- Prototyping and testing

ISO 9241 Part 210
Human-centred design for interactive systems



Action Research (Framework)

- Stakeholders become co-researchers
- Research takes place in practice or community
- Cycles of Action, Planning, Reflection
- Extending scientific knowledge while also making a change in practice

Action research spiral framework
adapted from Lewin 1946

Williamson, G. R., Bellman, L., & Webster, J. (2011). Action research in nursing and healthcare. Sage.

RRD's End-user panel

- 140+ members
- Mostly older adults (55+ years old)
- Mostly from Enschede region
- Some with specific disease (e.g., back pain)
- **Example studies**: Questionnaires, focus groups, usability tests, interviews, long-term use studies at home

Call to action > You all are end-users!

PROJECT: WEARABLES IN REHABILITATION CARE




WOULD YOU LIKE TO HELP US WITH OUR PROJECT, THROUGH A SHORT INTERVIEW?

SAXION SMART SOLUTIONS

Go beyond standard methodologies for evaluation

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Opinion Piece

Time to act mature—Gearing eHealth evaluations towards technology readiness levels

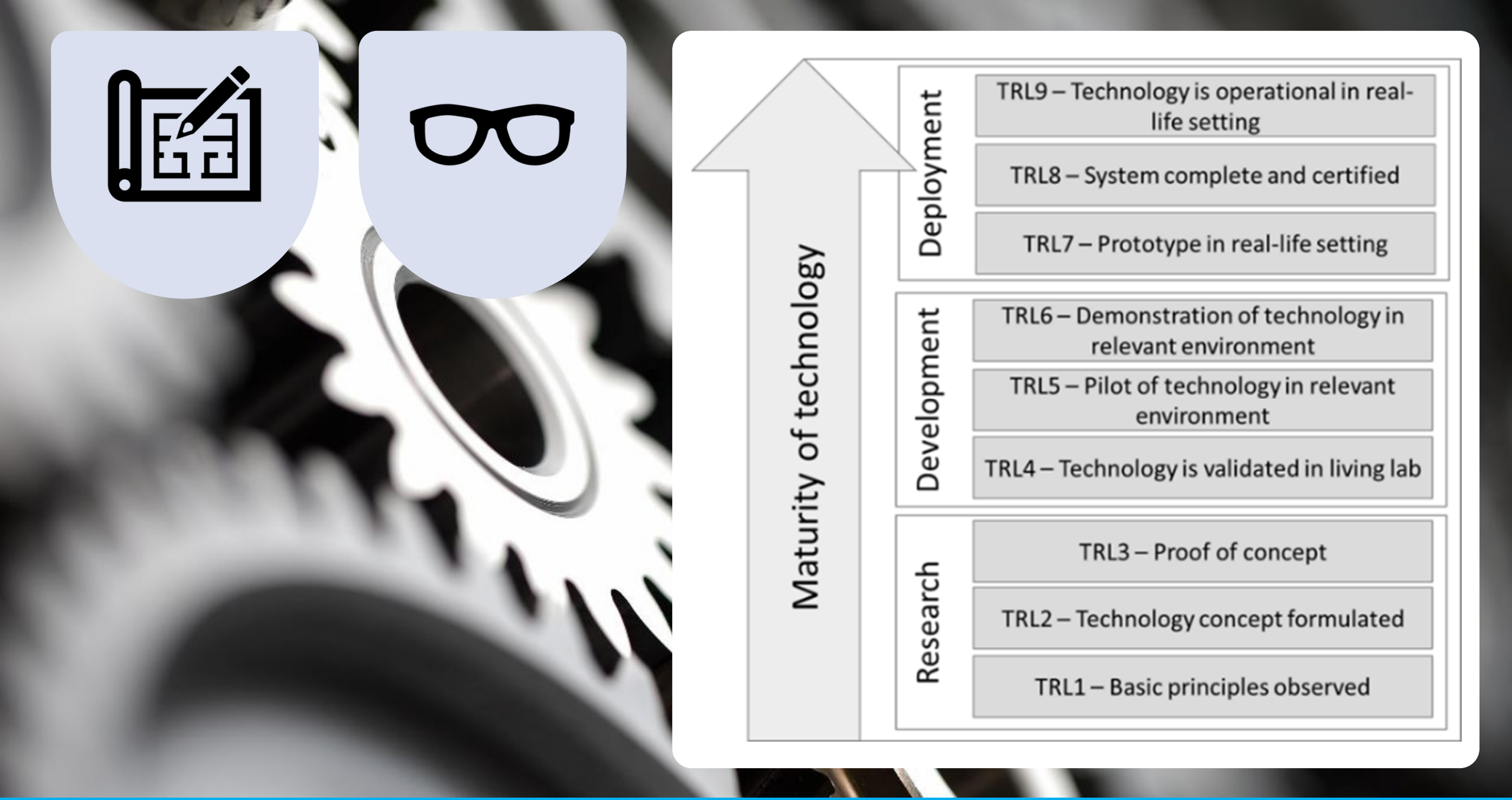
Stephanie Jansen-Kosterink [1,2], Marijke Broekhuis [1,2], and Lex van Velsen [1,2]

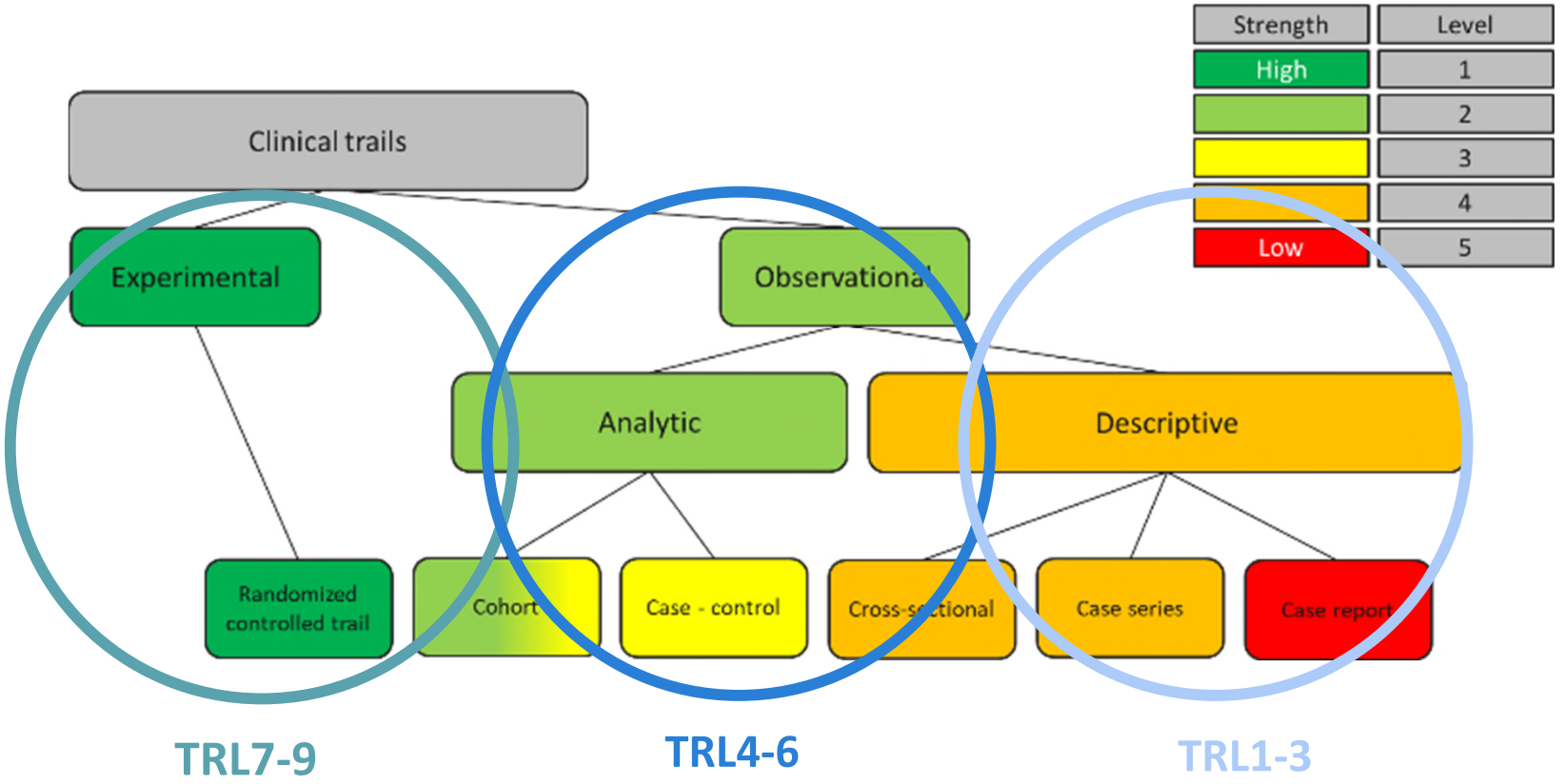
Abstract

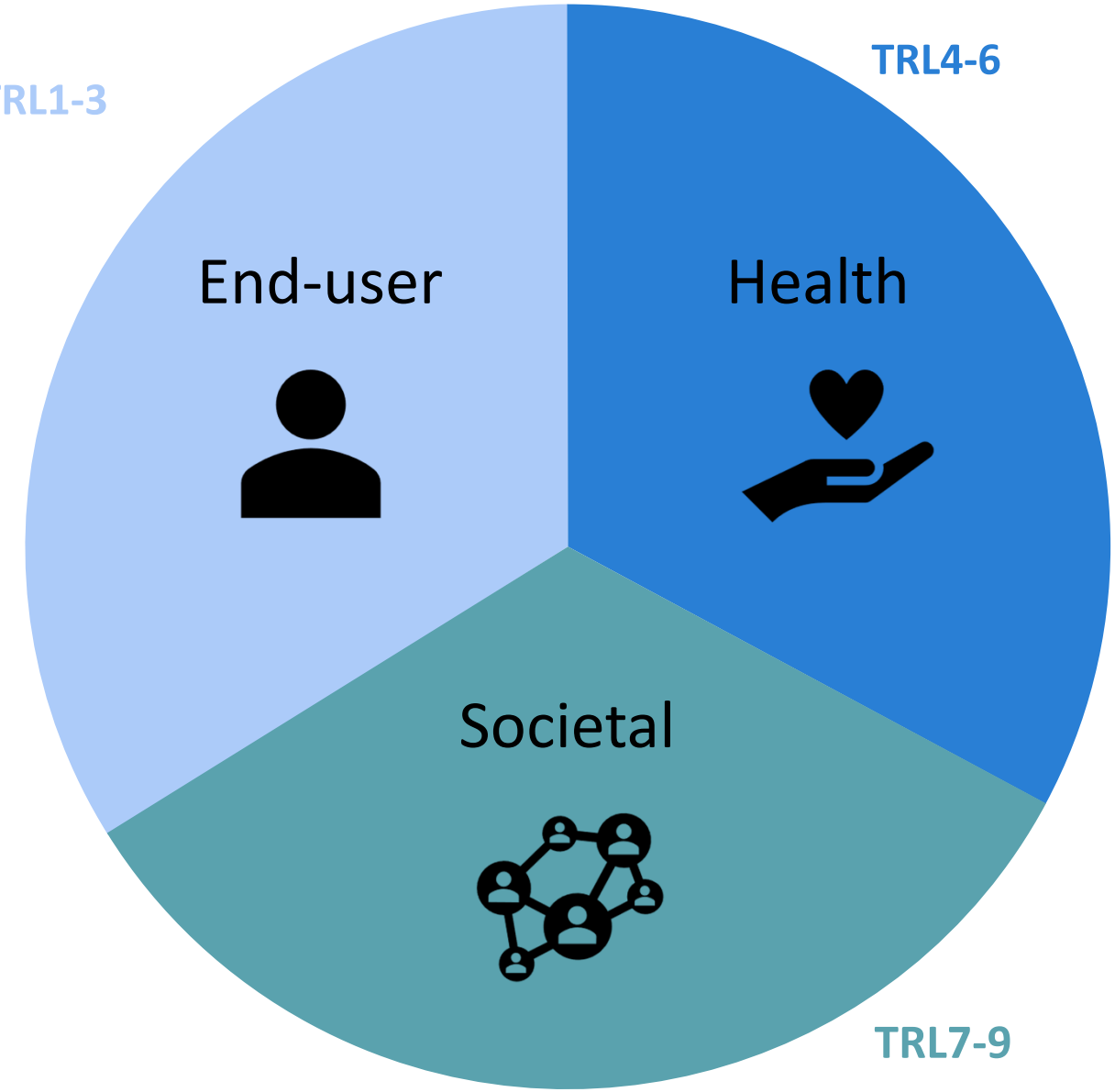
It is challenging to design a proper eHealth evaluation. In our opinion, the evaluation of eHealth should be a continuous process, wherein increasingly mature versions of the technology are put to the test. In this article, we present a model for continuous eHealth evaluation, geared towards technology maturity. Technology maturity can be determined best via Technology Readiness Levels, of which there are nine, divided into three phases: the research, development, and deployment phases. For each phase, we list and discuss applicable activities and outcomes on the end-user, clinical, and societal front. Instead of focusing on a single perspective, we recommend to blend the end-user, health and societal perspective. With this article we aim to contribute to the methodological debate on how to create the optimal eHealth evaluation design.

Keywords

eHealth, evaluation, design, technology readiness level, continuous process, perspectives


Maturity of technology
Deployment
TRL9 – Technology is operational in real-life setting
TRL8 – System complete and certified
TRL7 – Prototype in real-life setting
Development
TRL6 – Demonstration of technology in relevant environment
TRL5 – Pilot of technology in relevant environment
TRL4 – Technology is validated in living lab
Research
TRL3 – Proof of concept
TRL2 – Technology concept formulated
TRL1 – Basic principles observed

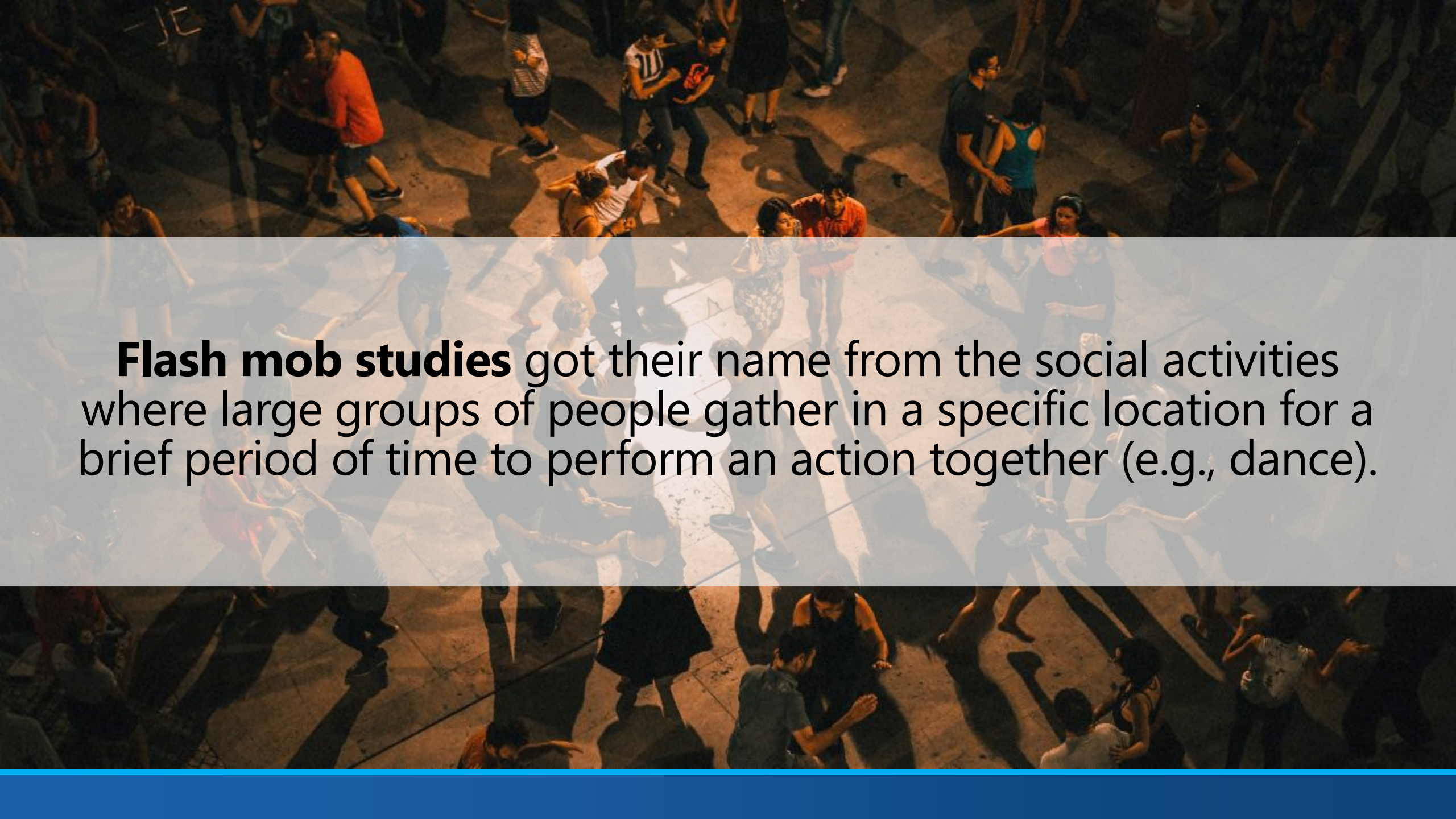

Strength
Level
High
1
2
3
4
Low
5
Clinical trails
Experimental
Observational
Analytic
Descriptive
Randomized controlled trail
Cohort
Case - control
Cross-sectional
Case series
Case report
TRL7-9
TRL4-6
TRL1-3


TRL1-3
TRL4-6
End-user
Health
Societal
TRL7-9

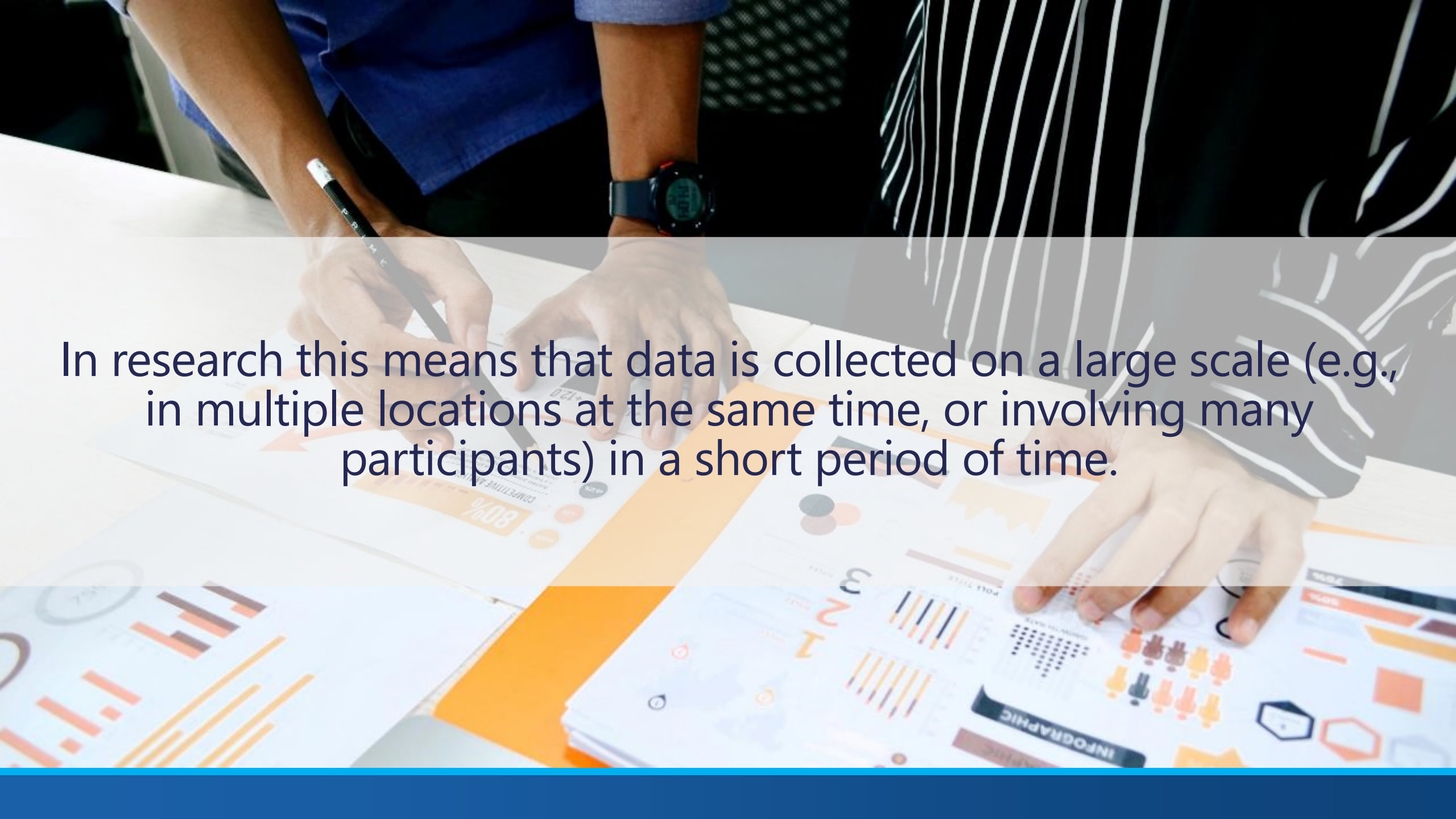
End-user perspective

Acceptance studies

Formative / summative usability studies



Flash mob studies got their name from the social activities where large groups of people gather in a specific location for a brief period of time to perform an action together (e.g., dance).



In research this means that data is collected on a large scale (e.g., in multiple locations at the same time, or involving many participants) in a short period of time.

Roessingh
Centrum voor Revalidatie

- 23 patients interacted with Scotty
- 15 patients completed evaluation
  - 53.3% female
  - 57.5 years old (SD=12.8)

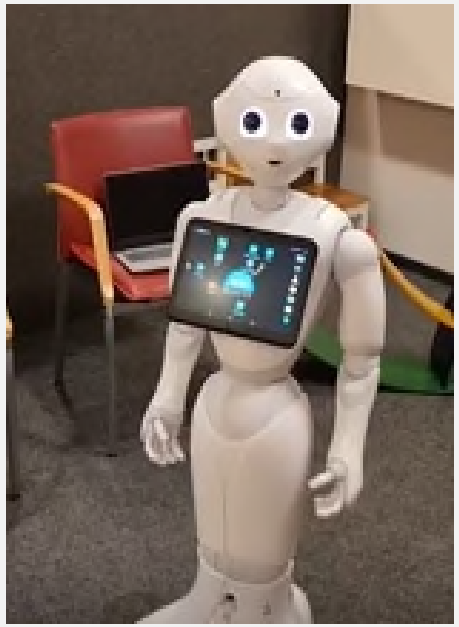
Ease of use

3.7

Intention to use

3.1

"I understand that this is the future, but what time have we arrived at that we need robots in healthcare?"



zorggroep sint maarten

- 49 employees and older adults interacted with Scotty
- 11 employees and 1 older adult completed evaluation
  - 75% female
  - 43 years old (SD=16.7)

Ease of use

3.3

Intention to use

3.4

"The personal aspect is gone now."

"Interesting, but it needs further development."

Health perspective

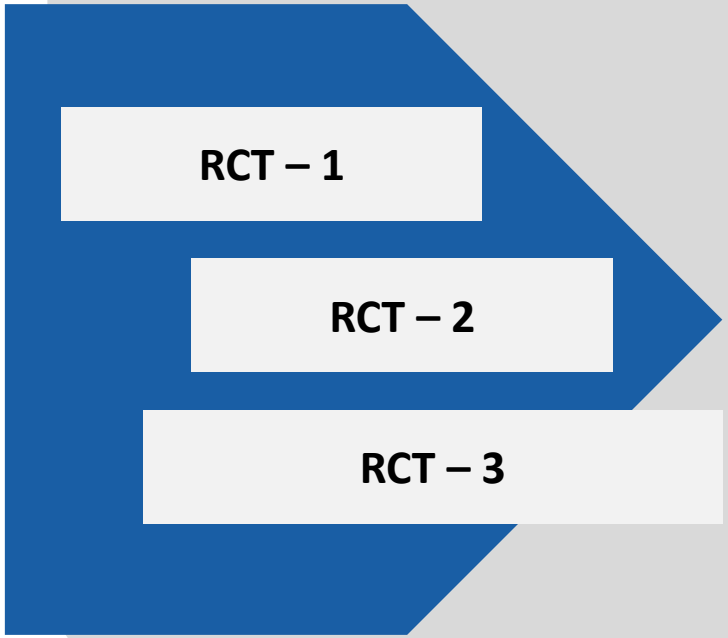
Effectiveness

Safety

cmRCT

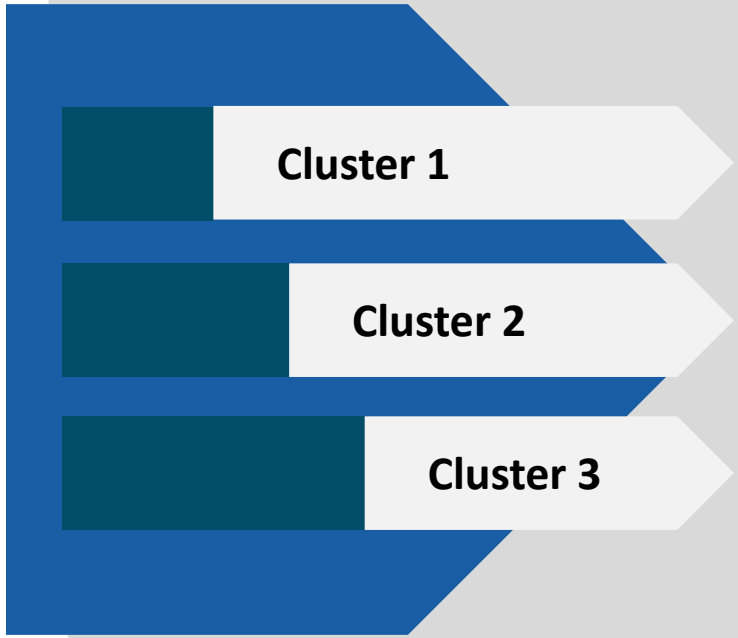
cohort multiple Randomized Controlled Trial

Relton et al., 2010



SWT

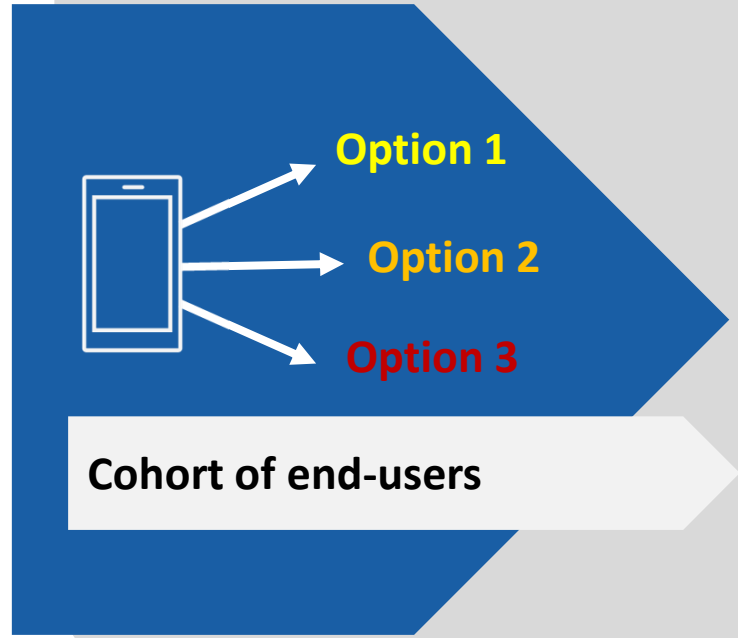
Stepped wedge cluster randomised trial



MRT

Micro-randomized trail

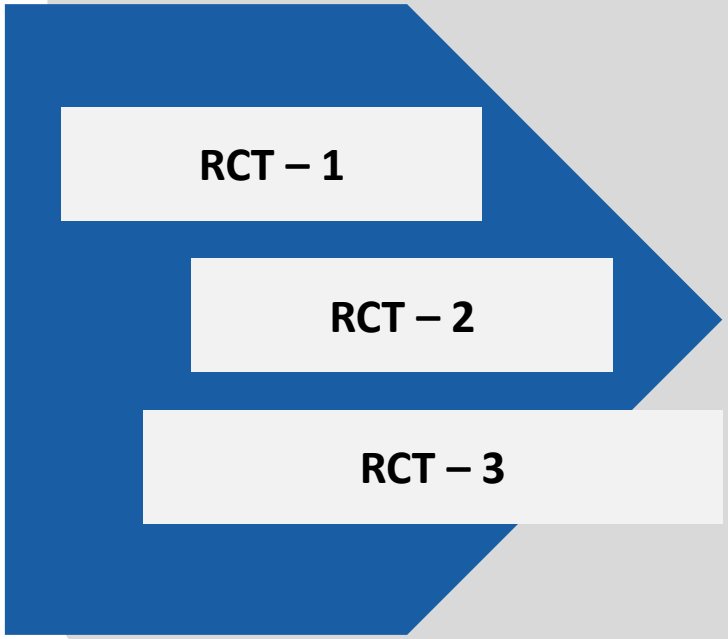
Klasnja et al., 2015



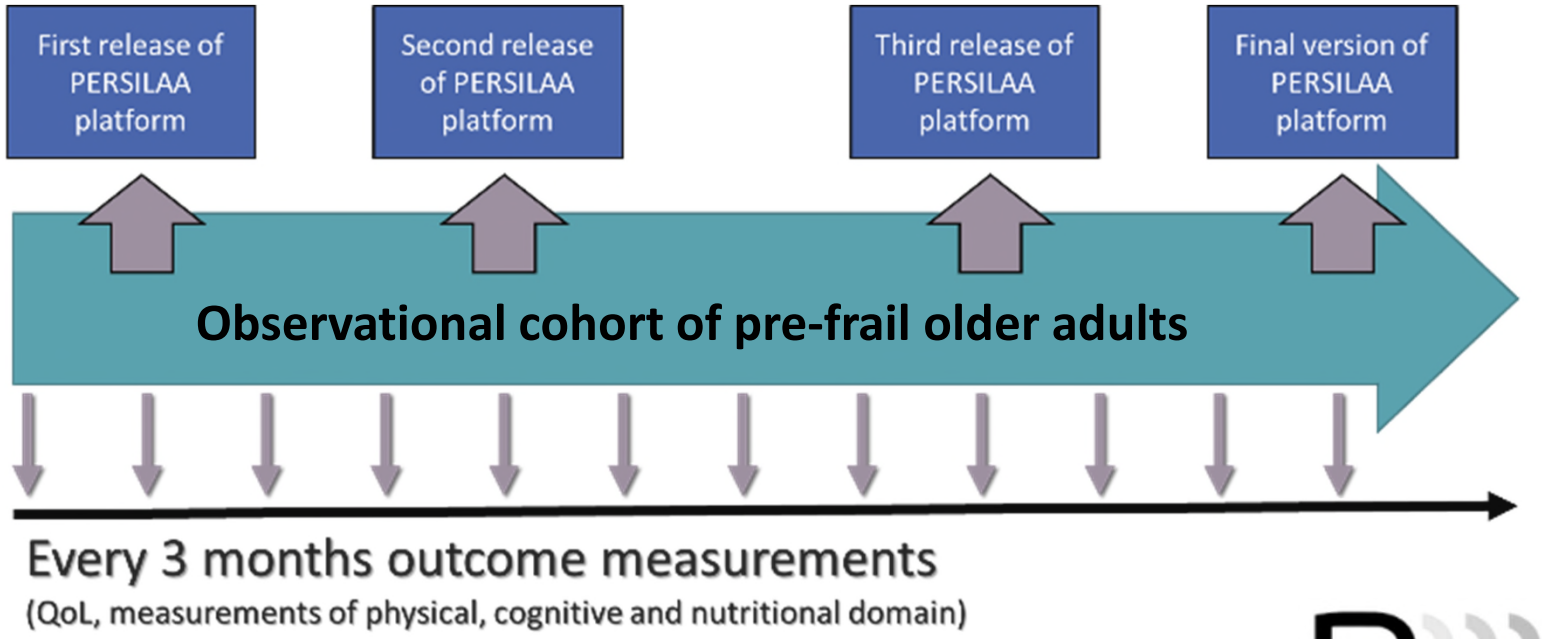
cmRCT

cohort multiple Randomized Controlled Trial

Relton et al., 2010



- cmRCT offers the opportunity to perform or facilitate randomized trials for multiple interventions simultaneously
- The basis of the cmRCT is an observational cohort of patients with the same condition



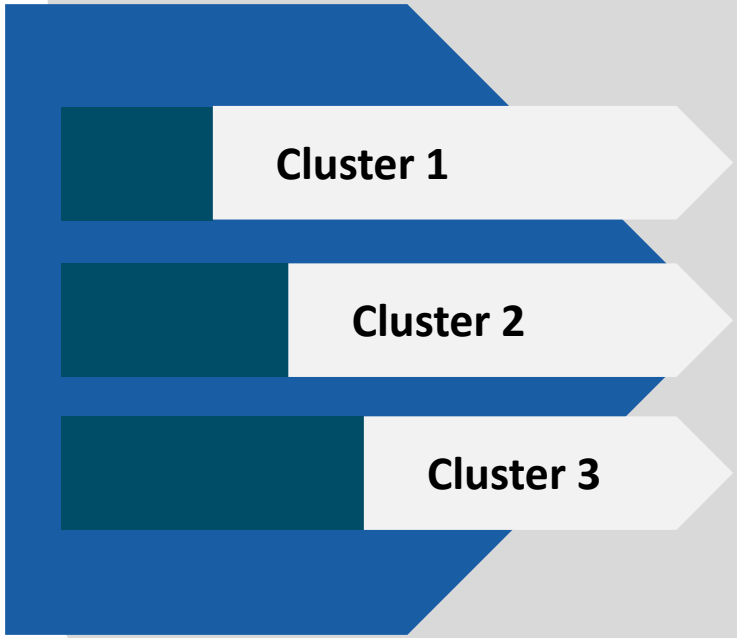
Dekker-van Weering, M., Jansen-Kosterink, S., Frazer, S., & Vollenbroek-Hutten, M. (2017). User experience, actual use, and effectiveness of an information communication technology-supported home exercise program for pre-frail older adults. *Frontiers in medicine*, *4*, 208.

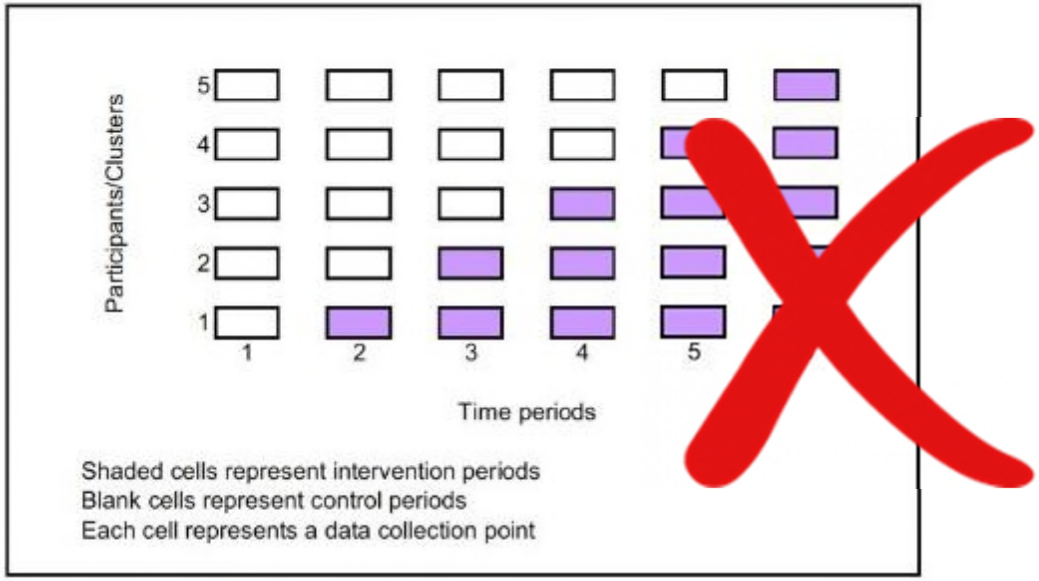
PERSSILAA

SWT

Stepped wedge cluster randomised trial

- The stepped wedge is a pragmatic study design with the focus on implementation
- It is an alternative to parallel cluster trial designs
- Randomisation on cluster level instead of individual level (general practice, hospital ward, or hospital)





MRT

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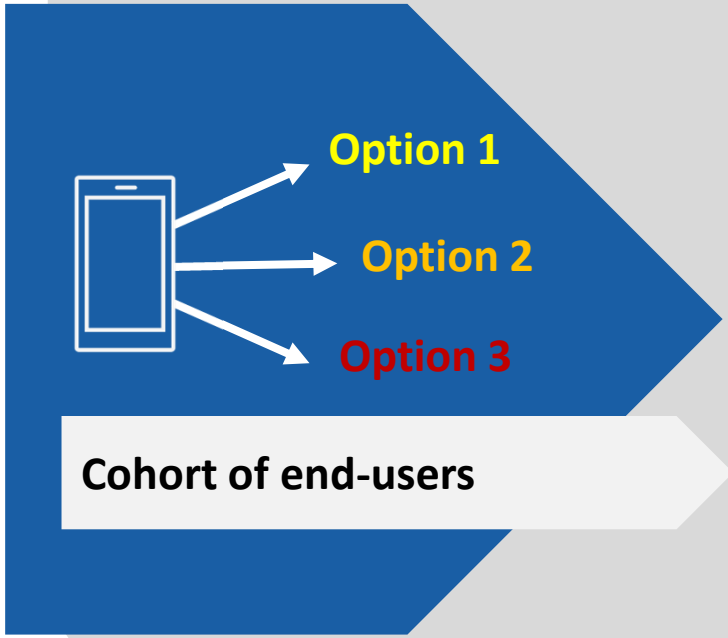
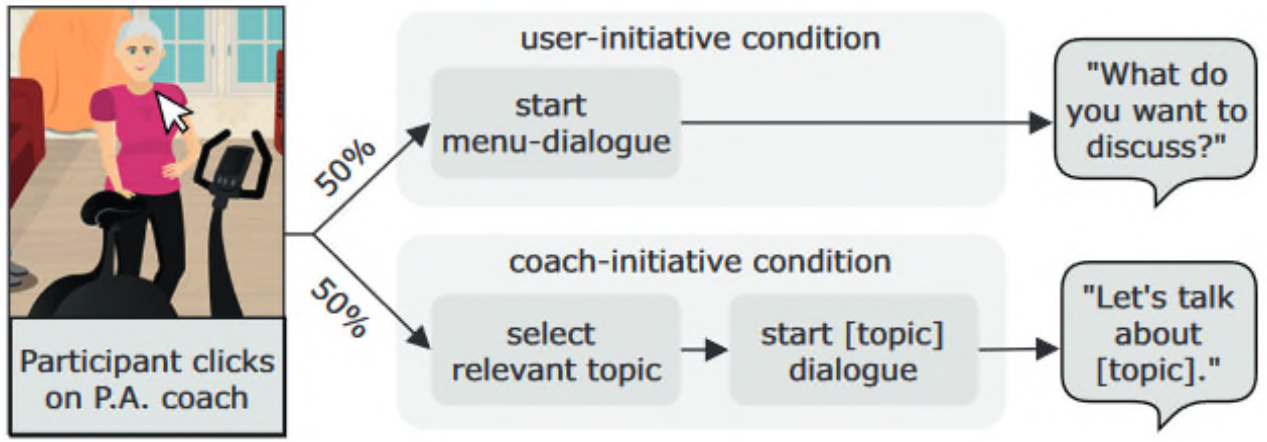


- An experimental approach that can be used to build Just-In-Time Adaptive Interventions
- Individuals are randomized hundreds or thousands of times over the course of the study.
- The data can be used to investigate the effects of just-in-time intervention options



Beinema, T., Op den Akker, H., Hurmuz, M., Jansen-Kosterink, S., & Hermens, H. (2022). Automatic topic selection for long-term interaction with embodied conversational agents in health coaching: A micro-randomized trial. Internet interventions, 27, 100502.

COUNCIL of COACHES

Societal perspective

Costs

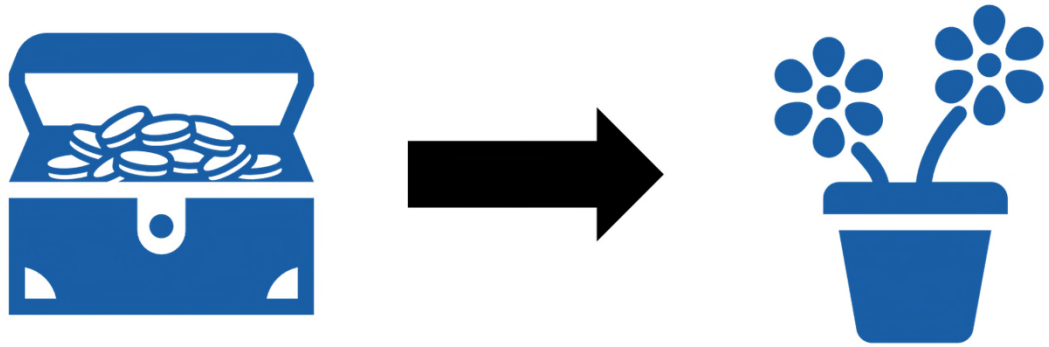
Societal impact

Which innovations are worthwhile?

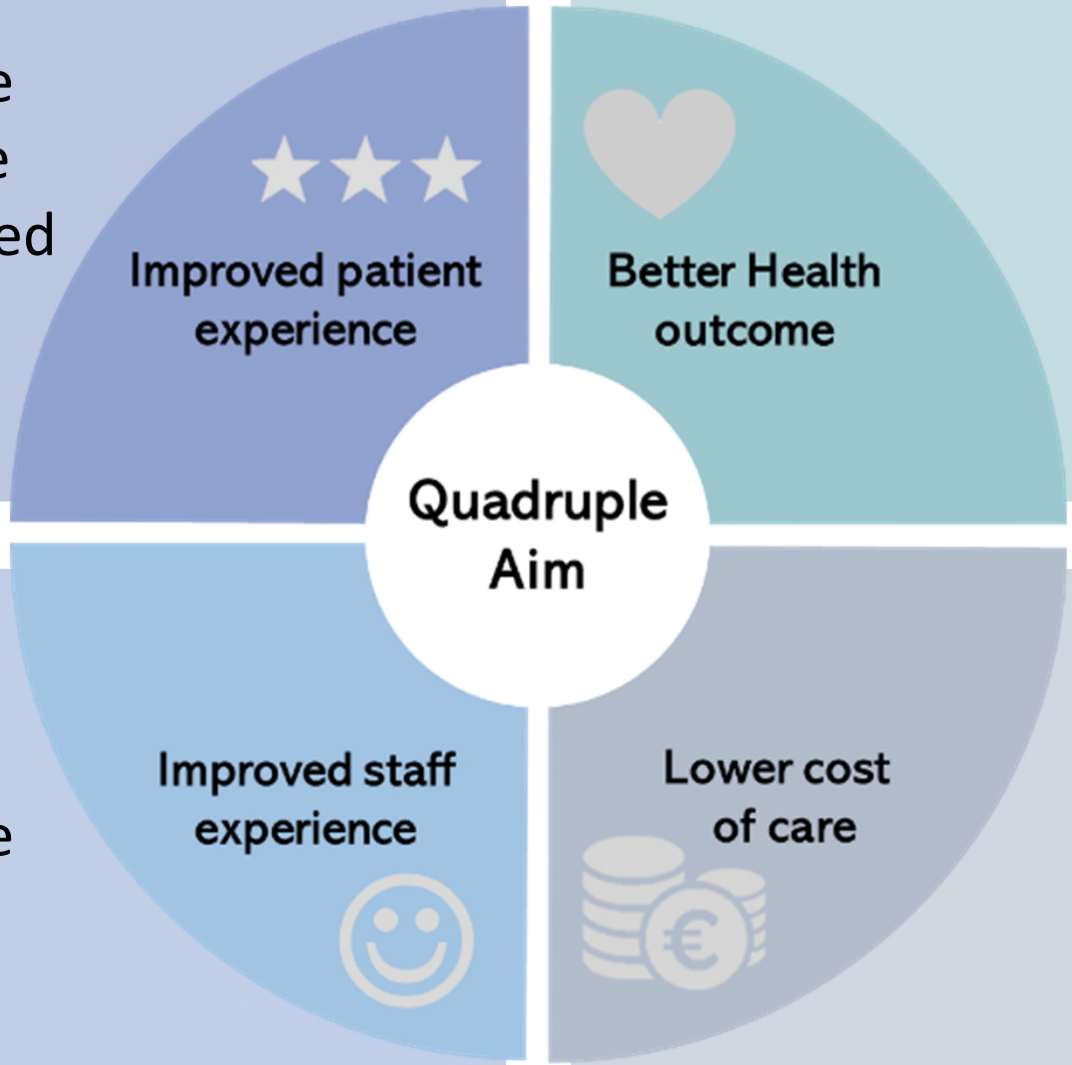
Limited **resources** and **capacity** in healthcare force us to make choices about which innovations will be continued and scaled up.

SROI method

- The internationally recognised **Social Return on Investment (SROI) method** offers the possibility to predict in advance, to monitor and to evaluate the societal value of an innovation.
- In addition to the **SROI ratio** (= total output / total input), the SROI provides a starting point to achieve sustainable implementation with all stakeholders.



Improving the experience that patients/clients have with the care they received



Improving the health of the general population

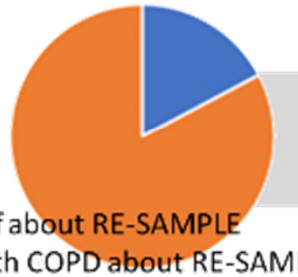
Improving the experience and perception of healthcare personnel

Reducing/decreasing per capita healthcare costs

- **RE-SAMPLE** will work to transform the healthcare journey of patients with COPD, and to set a standard of care for patients suffering from complex chronic conditions
- **RE-SAMPLE** will use real-world data (RWD) to monitor COPD symptoms beyond scheduled medical check-ups.
- The data and analyses will feed into the development of personalised treatment and a *virtual companionship programme*.

Input

Patient:
- Learns about RE-SAMPLE
- Onboarding to the program and learns how to use it.
- Self-management training
- Use of application



Hospital
- Inform clinical staff about RE-SAMPLE
- Inform patients with COPD about RE-SAMPLE
- Overall coordination
- Use of RE-SAMPLE by clinical staff
- Purchase wearables
- RE-SAMPLE licence
- Maintenance of edge node architecture

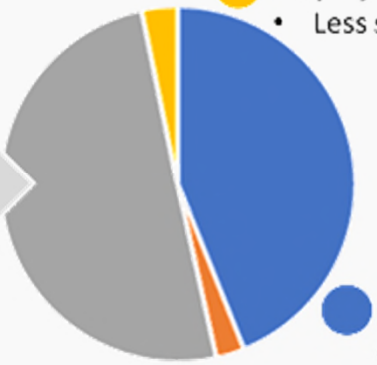
Total input: € 456,591

SROI ratio 1.38

Output

Healthcare insurer:
- Early treatment of exacerbations
- Less GP consults

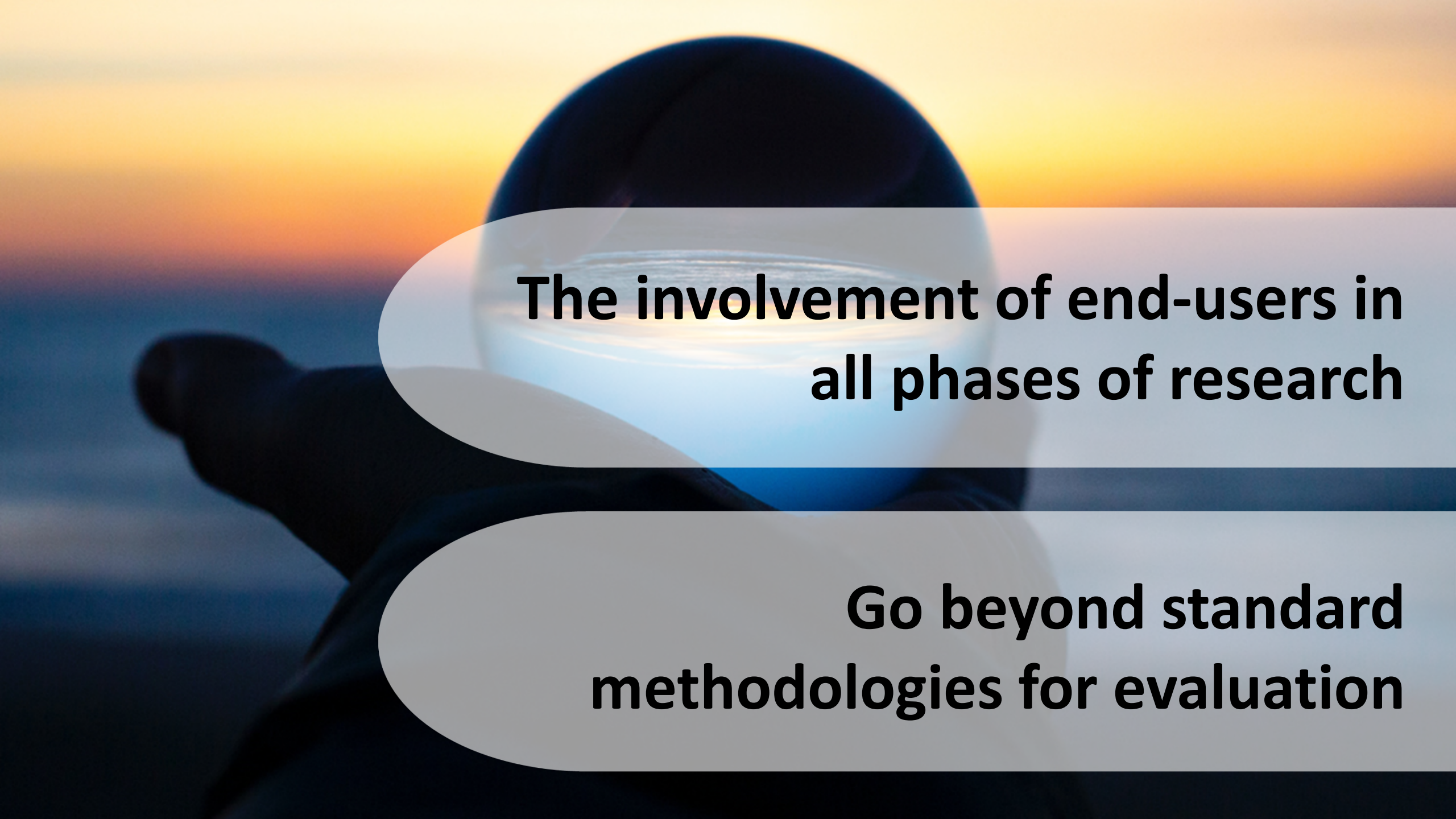
Employer:
- Less sick days at home



Patient:
- Increased quality of life
- Less GP visits

Hospital:
- Access to research data
- Better quality of care
- Increased work-satisfaction clinical staff

Total output: € 629,407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Go beyond standard methodologies for evaluation

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