Reflections on Human Values in Crowd-based Requirements Engineering

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Human Values
- Guiding Values
- Percieved Values

Crowd RE
- Case: SmartAge Project
- Feedback Loop

Human Values in Crowd RE
- Product
- Platform

Guiding Values

guiding principles of what people consider important in life

Values

Humans

Values **IN** Life

Guiding Values **IN** RE: Personal Values

- Often cited in RE research

- 10 values found in all cultures, assumed to be stable

- Implicit, can be measured through SVS questionnaire (https://www.thevaluesproject.com/)

Table 2 Personal values determined by Schwartz (Schwartz 1992; Schwartz et al. 2001) and short descriptions for each

Value type	Motivational goals
Achievement	Personal success through demonstrating competence according to social standards
Benevolence	Preservation and enhancement of the welfare of people with whom one is in frequent personal contact
Conformity	Restriction of actions, inclinations and impulses likely to accept or harm others and violate social norms or standards
Hedonism	Pleasure and sensuous gratification to oneself
Power	Social status and prestige, control and dominance over people and resources
Security	Safety, harmony and stability of society, of relationship, and of self
Self-direction	Independent thought and action-choosing, creating, exploring
Stimulation	Excitement, novelty and challenge in life
Tradition	Respect, commitment and acceptance of the customs and ideas that traditional culture or religion provide the self
Universalism	Understanding, appreciation, tolerance and protection for the welfare of all people and for nature

Perceived Values

result of the comparison between perceived benefits and sacrifices of the product by the customer

Humans

Perceived value

Value **OF** an Entitiy:
Entity **has properties**
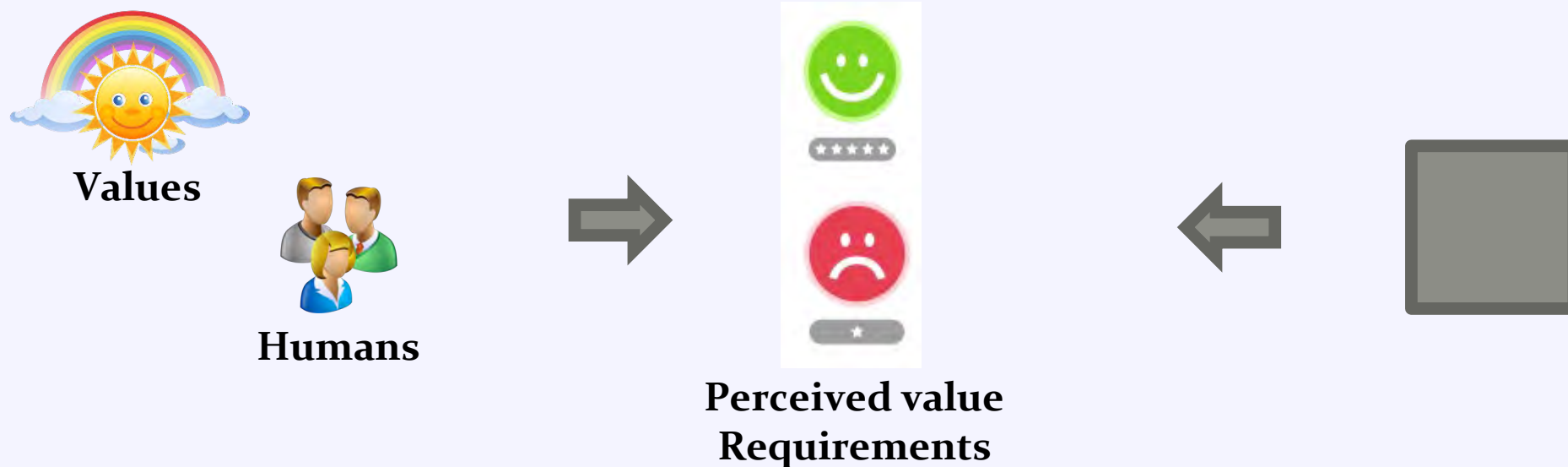which influence the perceived value
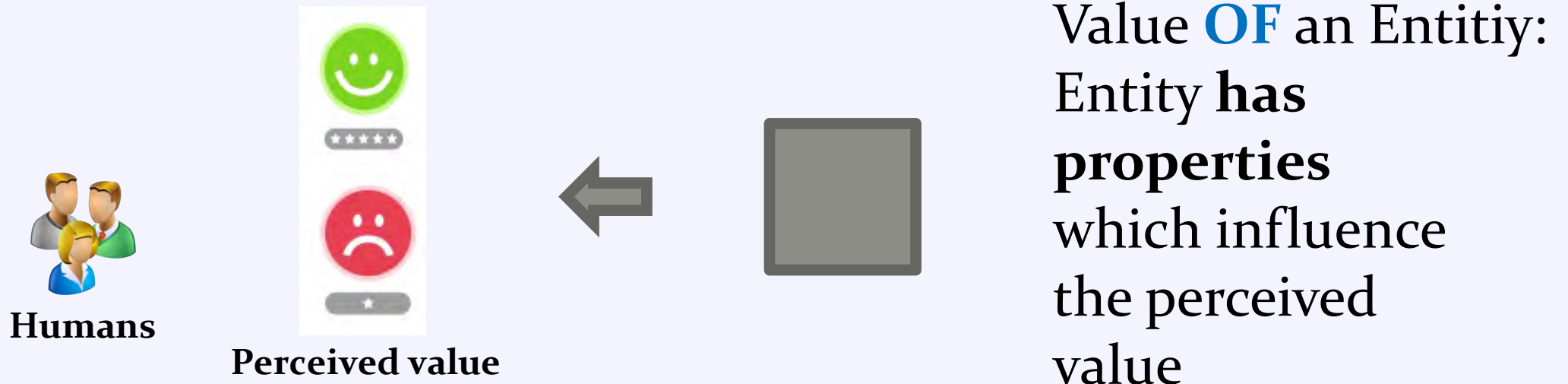
Example: Perceived Values **OF** RE Practice

The systematic and disciplined approach to the specification and management of requirements **with the goal of**

- **understanding the stakeholders' desires and needs and**

- **minimizing the risk of delivering a system that does not meet these desires and needs**.

(CPRE2022)

Guiding Values and Perceived Values

Values

Humans

Perceived value Requirements

Guiding values of users influence the
perceived value and requirements of the software
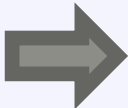**based on the effects the software has on the guiding values**

Stakeholders
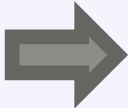

Values   Users

Corporate Values   Customer

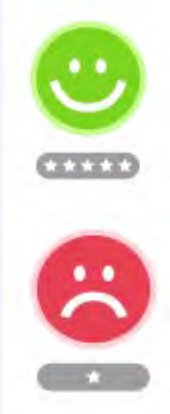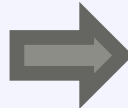Values   Developers

Corporate Values   Producer

Guiding Values of Developers

- Values Q-Sort

- Statements based on Personal values and ACM Code of Ethics

- https://www.acm.org/code-of-ethics

CF1	Socially-Concerned & Considerate, (P1, P2, P3, P6)
CF2	Ambitious & Non-Conformist, (P4, P5)
NF1	Dependable & Considerate, (P12, P17, P22, P23, P24)
NF2	Market Conscious & Autonomous, (P11, P18, P20)

Project VaREMed

- Hypothesis: Personal values influence attitudes towards general features
- Personal Values should not be elicited to **respect privacy**
- Hypothesis: Attitudes towards user tasks can be used as proxies
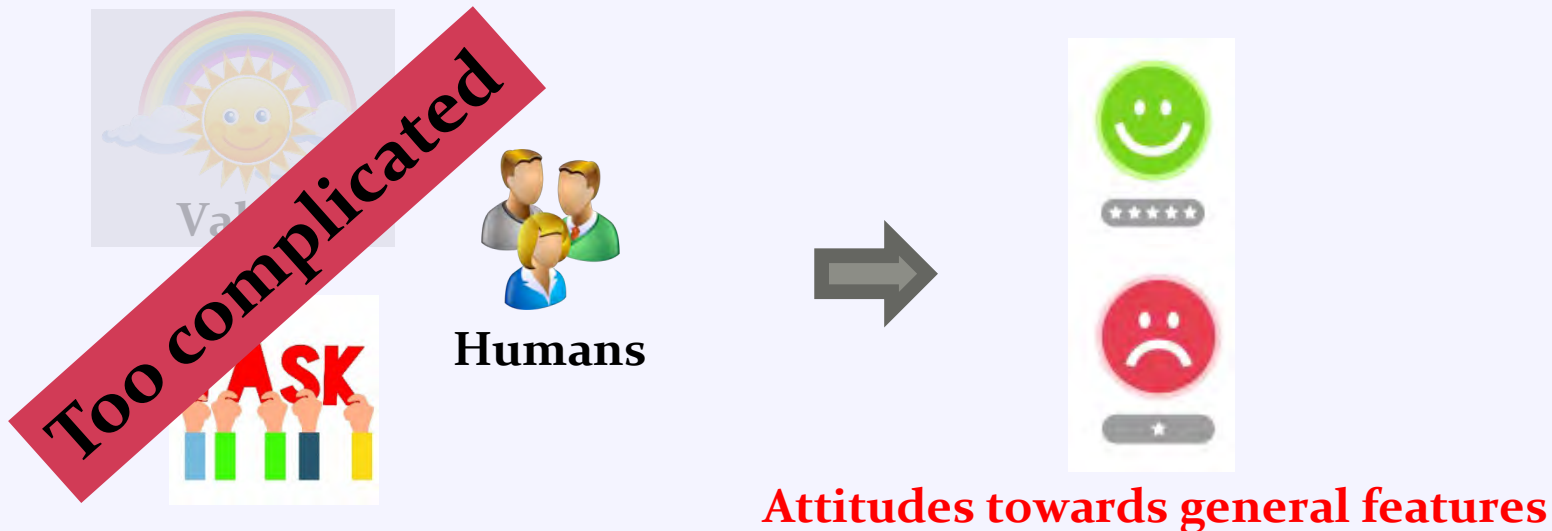- Research: First study with nurses shows correlation

Humans

Attitudes towards general features

Task	Benevolence	Self-direction	Hedonism
Help the patient during everyday tasks (e.g. bathing, combing)	Preferred (2 vs. 2,4)		

Table 6 Results of the case study: Key tasks to predict the users' dominant personal value (1 = high preference ... 6 = low preference)
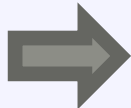
Personal Values should be **implicit**

We should not require stakeholders in our methods to openly discuss their personal values
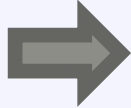(*this compromises privacy*)

Further Stakeholders

Values

Users
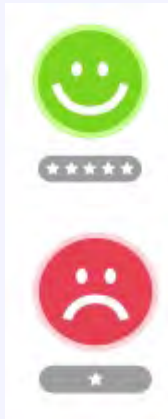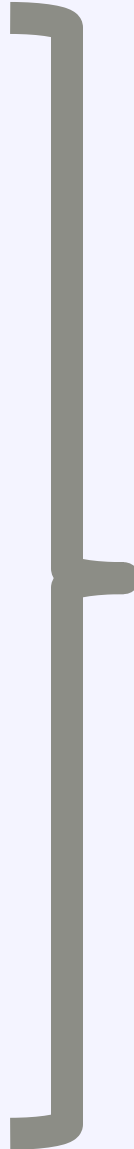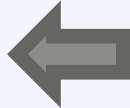
Corporate Values

Customer

€

Professional Values

Developers

Corporate Values

Producer

€

Society
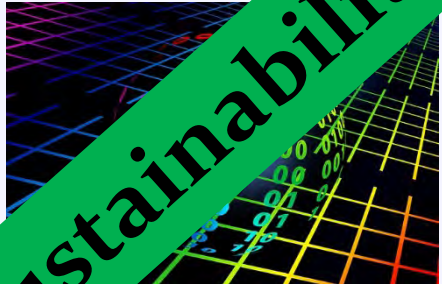
Sustainability

Nature

The Karlskrona Manifesto for Sustainability Design

https://www.sustainabilitydesign.org/karlskrona-manifesto

respects all stakeholders

■ **Individual** sustainability refers to maintaining human capital (e.g., health, education, skills, knowledge, leadership, and access to services).

■ **Social** sustainability aims at preserving the societal communities in their solidarity and services.

■ **Economic** sustainability aims at maintaining capital and added value.

■ **Environmental** sustainability refers to improving human welfare by protecting the natural resources: water, land, air, minerals and ecosystem services.

■ **Technical** sustainability refers to longevity of information, systems, and infrastructure and their adequate evolution with changing surrounding conditions.

Sustainability Awareness Framework

https://www.suso.academy/en/sustainability-awareness-framework-susaf/

Sustainability Guiding Principles for RE (**SGP**)
What are effects of the product on these values?
These effects influence perceived value!

Social
- Sense of community
- Trust
- Inclusiveness and diversity
- Equity
- Participation and Communication

Individual
- Health
- Lifelong Learning
- Privacy
- Safety
- Self-Awareness and Free will

Environmental
- Material and Ressources
- Waste and Polution
- Bio diversity
- Energy use
- Logistics

Economic
- Value
- Customer Relationship Management
- Supply Chain
- Governance
- Innovation

Technical
- Maintainability
- Usability
- Adaptability
- Security
- Scalability

Sustainability Guiding Principles for RE

Social
- Sense of community
- Trust
- Inclusiveness and diversity
- Equity
- Participation and Communication

ACM Code
Health
Safety
Security
Privacy

Individual
- Health
- Lifelong Learning
- Privacy
- Safety
- Self-Awareness and Free will

Schwartz
Achievement
Power
Self-direction
Hedonism
Stimulation

Environmental
- Material and Resources
- Waste and Polution
- Bio diversity
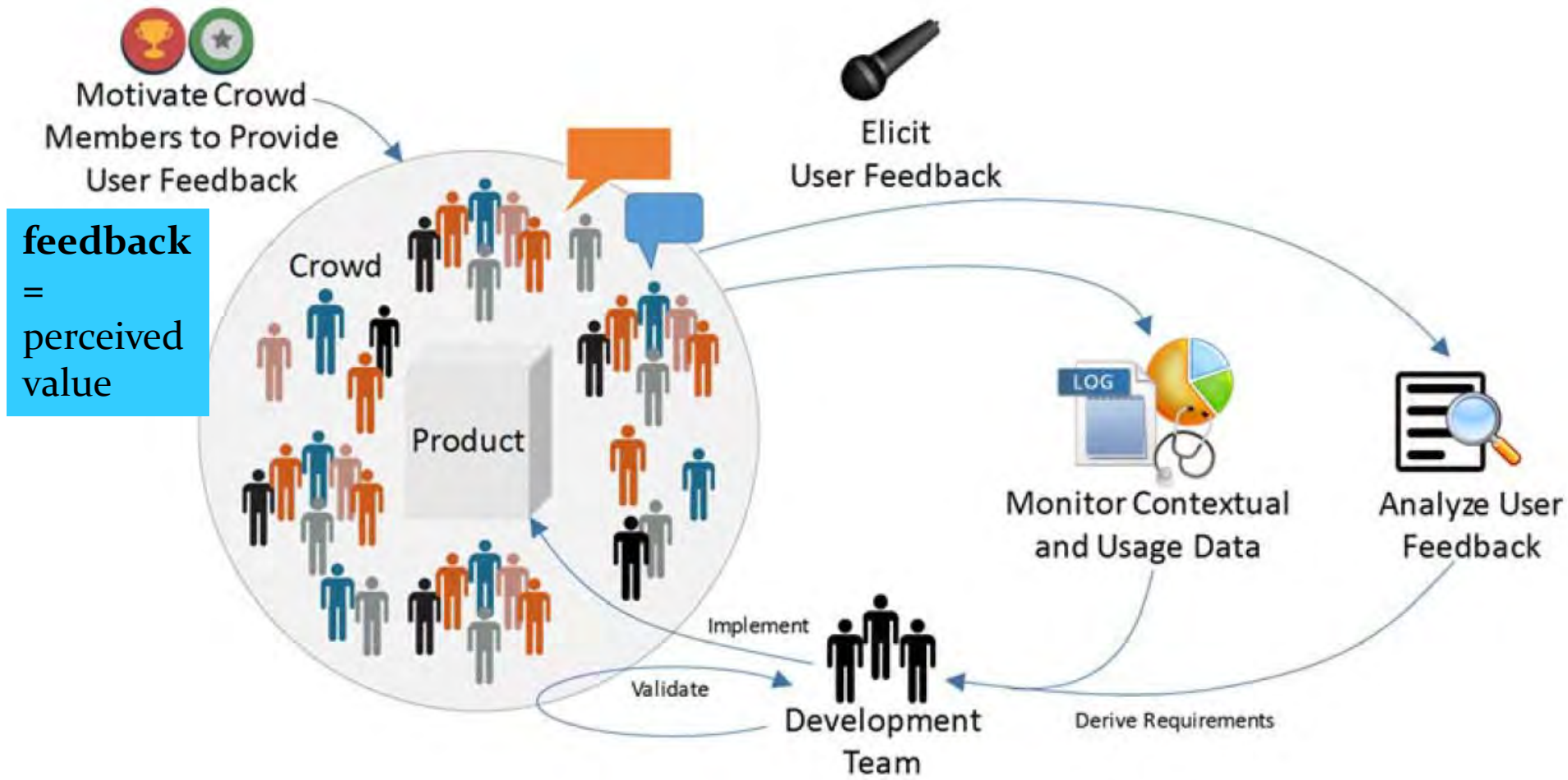- Energy use
- Logistics

Economic
- Value
- Customer Relationship Management
- Supply Chain
- Governance
- Innovation

Technical
- Maintainability
- Usability
- Adaptability
- Security
- Scalability

CrowdRE

feedback = perceived value

Groen, E.C. [et al.] (2017) The crowd in requirements engineering: the landscape and challenges. IEEE software. Vol. 34, issue 2, pp.44- 52.

Human Values wrt Product in CrowdRE

■ CrowdRE is **gathering the perceived value** of the users wrt product!

  – *What is the best way to gather perceived value wrt product in CrowdRE? => see next slide*

■ We can also use CrowdRE **to gather SGP** wrt. product

  – *Which SGP are important to the users and how does this influence the perceived value of the product?*

    ➢ Adapt the SusAF Workshop to a crowd-setting

    ➢ It is not clear whether SGP can be discussed in a crowd setting. Clearly only in a small crowd.

Human Values wrt CrowdRE Platform

- **Perceived value** of the Platform
  - *We should ask the crowd about feedback wrt platform*

- **Best way** to do CrowdRE => **SGP realized** in the design of the platform
  - *All SGP should be somewhat important to the developers! How can we reflect them in the design of the process and tools for crowdRE?*

CrowdRE

Participation and Communication with the crowd is important

With Big Crowds (Social Media) Companies are often only interested in quick evaluation (sentiment, A/B-test) and innovative suggestions

Motivate Crowd Members to Provide User Feedback

Elicit User Feedback

Crowd

Product

Validate

Implement

Development Team

Derive Requirements

Groen, E.C. [et al.] (2017) The crowd in requirements engineering: the landscape and challenges. IEEE software. Vol. 34, issue 2, pp.44- 52.
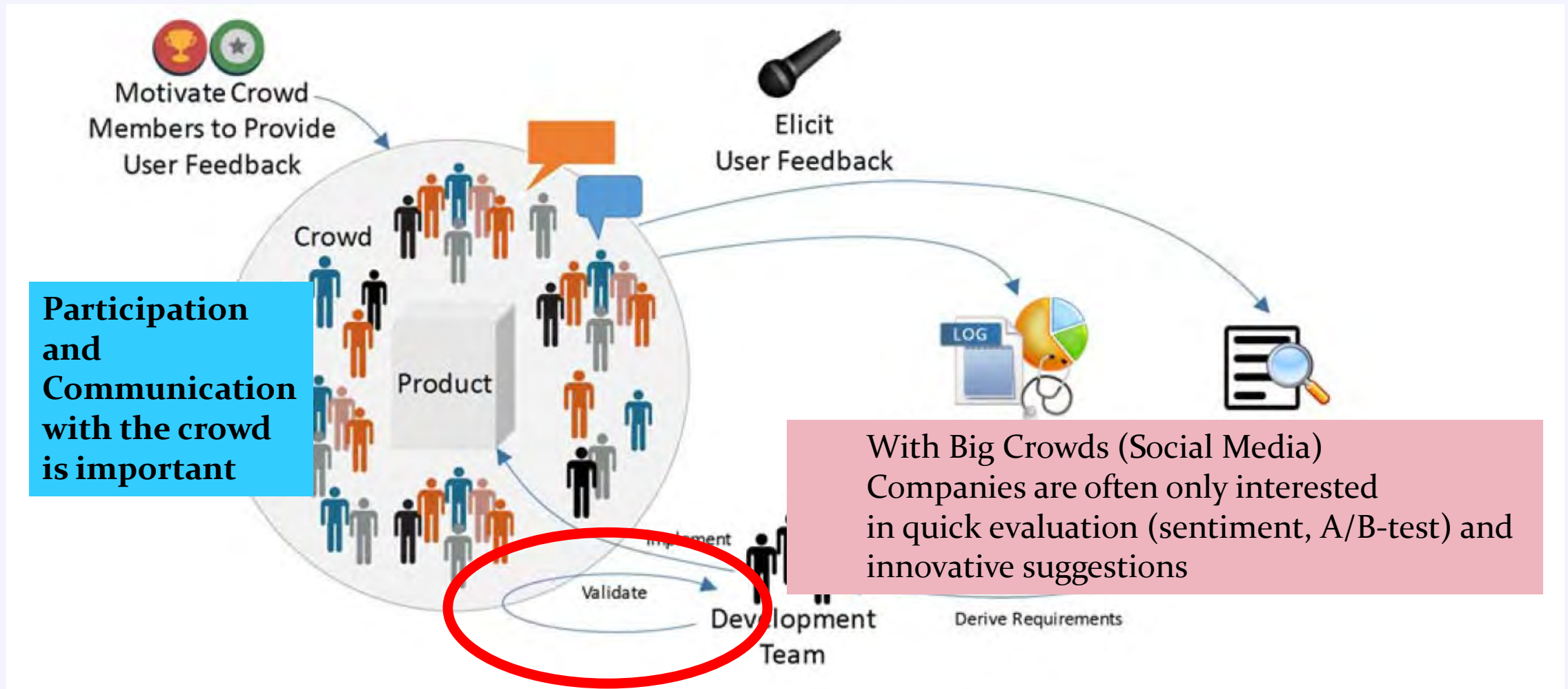
Goal 1: Investigate whether and to what extent intelligent assistance systems (Apps) improve the quality of life of older adults (≥ 67 years)
- smartVERNETZT: promotes social networking and social participation
- smartIMPULSE: provides health self-monitoring and advice for older adults

Goal 2: Investigate the acceptance of the Apps (including Platform)

Disciplines: Geriatrics, Gerontology, Philosophy, Ethics, Medicine, Software Engineering, Sports Science, Robotics, Economics
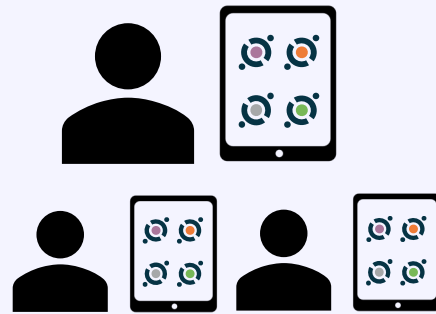
Number of researchers: around 30

Study participants: 700
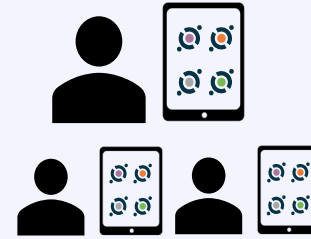
Location: Heidelberg/Mannheim (Germany)

smart age
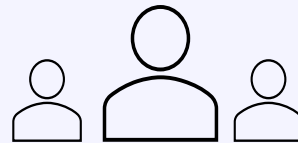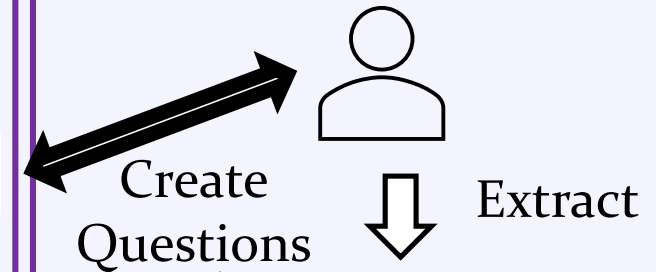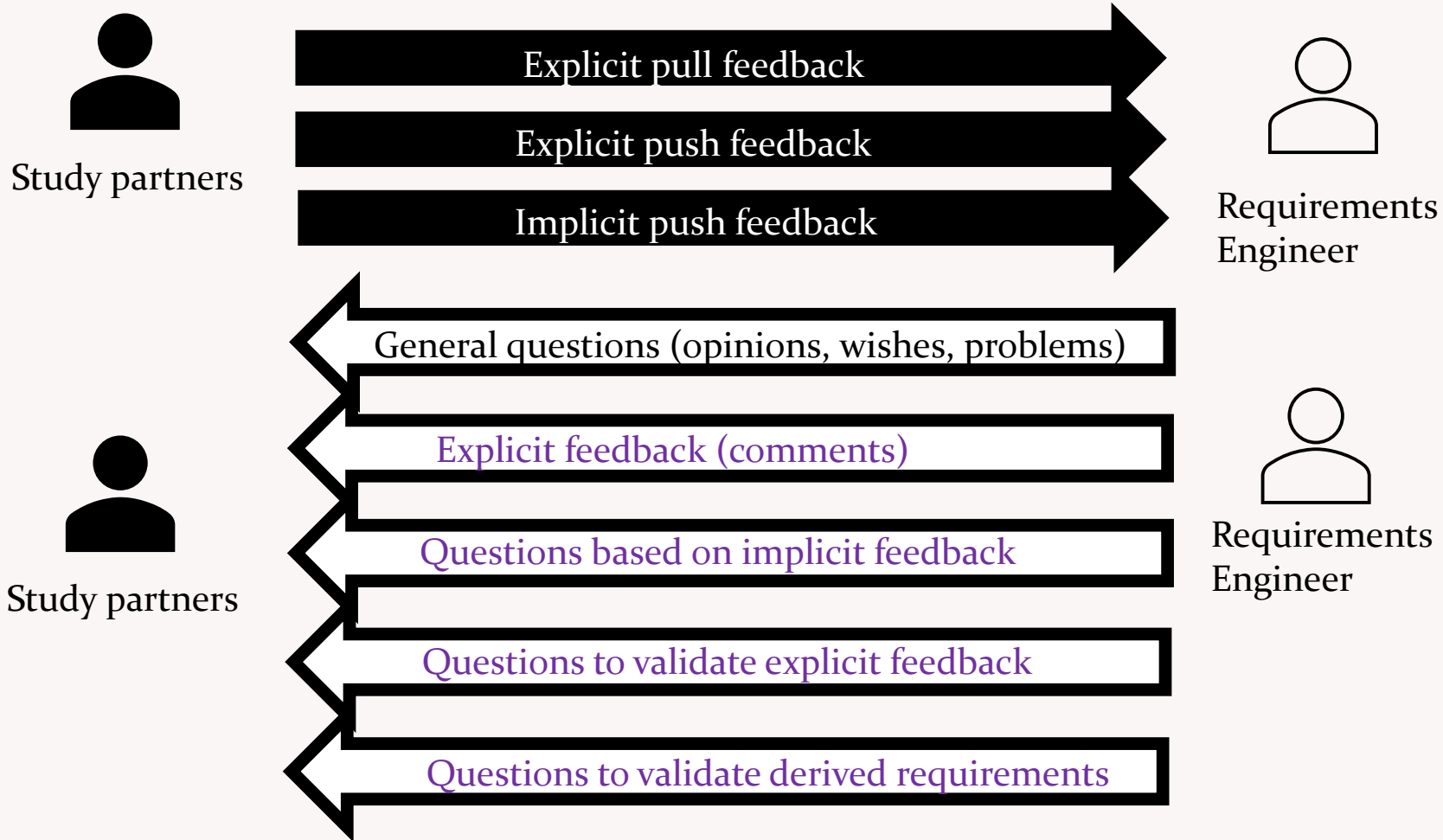
SGP = Quality of Life of Older Adults

Older Adults
Relationships
Home and Neighbourhood

Social
- Sense of community
- Trust
- Inclusiveness and diversity
- Equity
- Participation and Communication

Individual
- Health
- Lifelong Learning
- Privacy
- Safety
- Self-Awareness and Free will

Older Adults
Autonomy
Role and Activity
Health Perception
Positive Attitude
Emotional comfort
Spirituality

Environmental
- Material and resources
- Waste and Polution
- Bio diversity
- Energy use
- Logistics

Economic
- Value
- Customer Relationship Management
- Supply Chain
- Governance
- Innovation

Older Adults
Financial Security

Technical
- Maintainability
- Usability
- Adaptability
- Security
- Scalability

SGP in Platform smartFeedback(1)

Dimension of Quality of Life
Health perception
• OAs don't want to feel limited by their health • Declining motor and vision skills with advancing age

➡️

smartFEEDBACK
• Possibility to use voice messages instead of typing long texts • Design with high contrast, large fonts and interaction elements

Dimension of Quality of Life
Autonomy
• OAs have the desire to stay independent and choose what they want

➡️

smartFEEDBACK
• Possibility to either give pull- or push feedback or both

K. M. Van Leeuwenid *et al.*, "What does quality of life mean to older adults? A thematic synthesis," 2019, doi: 10.1371/journal.pone.0213263

L. Radeck et al., *Understanding IT-related Well-being, Aging and Health Needs of Older Adults with Crowd-RE*, REWBAH, IEEE, 2022.

smart age

SGP in Platform smartFeedback(2)

Dimension of Quality of Life
Role and activity, relationships and emotional comfort
• OAs like to engage in activities that keep them occupied • OAs also want to feel able to contribute to society and make a difference by helping others • OAs like to experience that people care for them and appreciate them.

smartFEEDBACK

- Answering questions from the researchers keeps the OAs occupied and mentally active

- Creating and providing drawings might be joyful for the OAs

- The appreciation of the researchers *in the comments and the derived requirements* can make the OAs feel valuable and shows that they can make a difference for our project

K. M. Van Leeuwenid *et al.*, "What does quality of life mean to older adults? A thematic synthesis," 2019, doi: 10.1371/journal.pone.0213263

L. Radeck et al., *Understanding IT-related Well-being, Aging and Health Needs of Older Adults with Crowd-RE*, REWBAH, IEEE, 2022.

smart age

SGP in the smart age Project

- **Individual**
  - *Study partners with different IT-skill levels => we take high effort to introduce IT to them*
  - *The Apps are designed to support study partners in their health and education and skills wrt IT*
  - *smartFeedback and its process supports older adults (see before)*

- **Social**
  - *Study partners with different backgrounds*
  - *The Apps are designed to support social interaction (not in smartFeedback)*
  - *smartFeedback supports participation and communication (see before)*

- **Economic**
  - *The Apps (including smartFeedback) are not expensive*
  - *The Apps (including SmartFeedback) are handed over to the city government*

- **Technical**
  - *The Apps (including smartFeedback) support the "ilities"*

- **Environmental**

CfP: What are the effects of human values in CrowdRE on individual stakeholders, their contribution to RE, and on the crowd as a whole?

- Look at Perceived Values and SGP, not Personal Values

- Study **effects of SGP on Perceived Values of the Product**

- Study **effects of our tools and processes (designed according to SGP)**

Guiding Values and Perceived Values

Guiding values of users influence the perceived value and requirements of the software

Personal Values should be **implicit**

We should not require stakeholders in our methods to openly discuss their personal values
(*this compromises privacy*)

Sustainability Guiding Principles for RE (**SGP**)
What are effects of the product on these values?

CfP: How does CrowdRE contribute to understanding and handling the diversity of a crowd and the human values of all crowd members?

- We need to understand the **diversity in the perceived values** of the crowd. There is a lot of helpful work on **user satisfaction**. **Monitoring data** (implicit feedback) is an helpful addition (compared to interviews). There are, however, privacy issues.

- With the usual social media (App-Stores) it is **not** possible to understand or handle **diversity**. We need a **smaller** crowd (as representatives).
  - *Feedback Loop and a detailed process for requirements extraction needed*
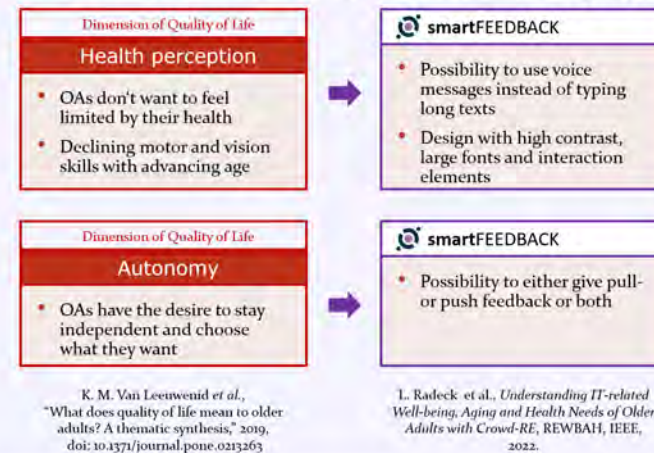 - *Frequent users vs. Other users=> see Paper by Michael Anders*

CfP: What are suitable CrowdRE approaches and technologies used to ensure human values in (1) a (software) product for all its crowd members?

Human Values wrt Product in CrowdRE

- CrowdRE is **gathering the perceived value** of the users wrt product!
  - *What is the best way to gather perceived value wrt product in CrowdRE? => see next slide*
- We can also use CrowdRE **to gather SGP** wrt. product
  - *Which SGP are important to the users and how does this influence the perceived value of the product?*
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SGP in smartFeedback(1)

Dimension of Quality of Life	
Health perception	**smartFEEDBACK**
• OAs don't want to feel limited by their health	• Possibility to use voice messages instead of typing long texts
• Declining motor and vision skills with advancing age	• Design with high contrast, large fonts and interaction elements

Dimension of Quality of Life	
Autonomy	**smartFEEDBACK**
• OAs have the desire to stay independent and choose what they want	• Possibility to either give pull- or push feedback or both

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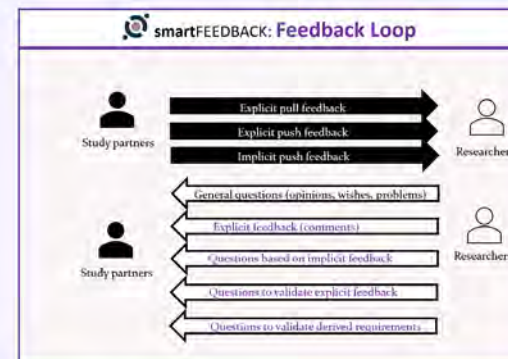
smart age

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CfP: What are suitable CrowdRE approaches and technologies used to ensure human values in (2) one or more of the four key activities of CrowdRE for all its crowd members?

- **Motivation and Elicitation**
  - *Develop standards for SGP in CrowdRE Platforms*
  - *Feedback Loop (also wrt Platform)*

- **Analysis:** *Feedback Loop*

- **Monitoring context and usage data**
  - *Due to privacy: Monitoring only of beta-users*

Human Values wrt CrowdRE Platform

- **Best way** to do CrowdRE => **SGP realized** in the design of the platform
  - *All SGP should be somewhat important to the developers! How can we reflect them in the design of the process and tools for crowdRE?*

- **Perceived value** of the Platform
  - *We should ask the crowd about feedback wrt platform*

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smartFEEDBACK: Feedback Loop

Study partners — Explicit pull feedback / Explicit push feedback / Implicit push feedback — Researchers

Study partners — General questions (opinions, wishes, problems) / Explicit feedback (comments) / Questions based on implicit feedback / Questions to validate explicit feedback / Questions to validate derived requirements — Researchers

smart age

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Most important: Humans!