eduIDT
Application of Inclusive Design Thinking in the Technically-Oriented Subjects at HEI

IDT Literature

A2.1 Analysis of IDT Literature

Co-funded by the European Union

Points from research & analysis

General information

Number:
49 sources

Methods:
UCD / HCD / Co-creation /
Co-Design / Design Thinking / Sustainability
(and others)

Topics:
Education / Health / eHealth / ICT / Social inclusion /
Community Building

Discriminatory grounds:

Gender, remoteness, wealth, disability, ethnicity, language, migration, displacement, incarceration, sexual orientation, gender identity and expression, religion and other beliefs and attitudes

UNESCO, 2020

Points from research

Education

- Education materials should be suitable for all learners without barriers
- Encouraging students to consider all their senses when designing inclusively, rather than concentrating solely on physical aspects
- Explore needs and frustrations based more on personal experience by observation and being in customer‘s shoes more than interviews

Examples: IT for social inclusion

- **Assistive technologies**, e.g. for depression patients, elderly, rehab patients
- **AR-glasses** for read/write-impaired youth
- Elderly **home care robotics**
- **Networking** for Multiple-Sclerosis-patients
- **Speech recognition**
- **Gloves digitalizing the alphabet** for deaf-blind people.
- **Language translation** for migrants

Points from research

Case Study: Designing mHealth Applications for Developing Countries

Papua New Guinea is known for being a country with one of the **highest maternal mortality rate** in the world. Many mHealth solutions remain prototypical due to their design and lack of empirical evidence.

Based on observations, designers came up with several **User-related Design Requirements**:

- **Integrate different languages** or symbols
- Design the **interface as familiar as possible** (UI like Facebook etc.)
- **Scale the solution's needs** adequately (data may be limited and sporadically accessible)
- Use of **gamification elements** as motivational aspect (and also networking functionalities)

Inclusive design brings in features that enable inclusion of excluded groups.

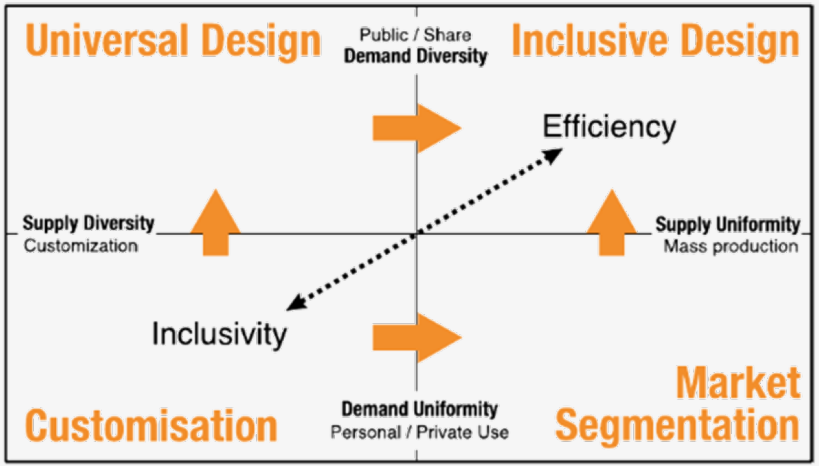
On the other hand, all users can benefit from features primarily designed for excluded groups or features inspired by their needs or frustrations.

Analysis and sources of IDT Literature

#1: Inclusive Design Thinking for Entrepreneurship

Framework:	Inclusive Design Thinking	**Author:**	Li, F., Dong, H.	**Year:**	Preprint
Topic:	Entrepreneurship	**Researcher:**	Eva Malichová	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research paper	**Link:**	n/a

- Business giants consider Inclusive Design as an important design strategy, on the contrary, start-up companies do business in a very competitive environment, and they face many challenges in incorporating inclusive design into their processes
- Ease of use, comfort and safety have become common design criteria for most products and services.
- "***Design exclusion*** occurs when the requirements for using a given product in a given environment exceed the user's capabilities" (Clarkson 2007).
- **Inclusive Design** aims to 'include more' rather than seeking to be 'usable by all' (Clarkson and Coleman 2015).
- Equality, diversity and inclusion are the broad aims of Inclusive Design (UK Engineering Council 2020)
- The more inclusive a product is to address the user's needs, the higher the perceived value of the product is to the user; the more inclusive the product is to accommodate the user's capabilities, the lower the cost of using the product is.
- Current Inclusive Design has focused on understanding the needs of diverse users, incorporating human factors into the design process, and encouraging user participation in collaborative design.
- Inclusive Design seeks to make the best possible use of resources on both the supply and demand sides.



- Use of definitions and some ideas for the explanation of the concept of IDT

#2: Strategies for supporting inclusive innovation: insights from South-East Asia

Framework:	Inclusive Design Thinking	**Author:**	Glennie A, Ollard J, Stanley I, Klingler-Vidra R	**Year:**	2020
Topic:	Entrepreneurship	**Researcher:**	Tomáš Grünwald	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research paper	**Link:**	Link

The study defines the different types of excluded groups, not only disabled people (blind, deaf, physically disabled), but also excluded due to:

- **demographic attributes** (age, sex, religion),
- **economic attributes** (rural areas, underdeveloped areas, poor districts vs rich ones, industrial and agricultural areas, access to education).

STRATEGIC APPROACHES

Technology should save us: directed primarily towards solving challenges faced by those who are currently least well-served by innovation, rather than those who are already well placed to benefit.

Innovation, everywhere: use innovation to drive the development of regional economies and thus address inequalities between regions. This may be expected to create opportunities for local businesses and entrepreneurs.

Innovation for the foundations: solving issues for groups that are excluded or underserved. In some cases, communities experience human capital development, which enables them to become producers as well as users or consumers of innovation and to achieve greater productivity themselves.

Dimension of inclusion	Indicator of an inclusive approach
Direction of innovation What kinds of innovations are being supported through innovation policy interventions? Whose needs are being met?	Innovations that address societal challenges and needs
	Innovations that address the particular needs of disadvantaged social groups
Participation in innovation Which regions, sectors and demographic groups are being enabled to participate in innovation?	Underrepresented and disadvantaged demographic groups
	Disadvantaged or lagging regions and districts
	Low-productivity, traditional or informal sectors
	Social economy/community organisations, social enterprises, cooperatives
Governance of innovation Who sets priorities for innovation policy, and how are its outcomes managed?	Citizens or civil society are involved in setting priorities for innovation policy
	Citizens or civil society are involved in the regulation of innovation (e.g. emerging technologies)
	Measures to identify and mitigate the risks and negative impacts of innovation for particular groups
	Measures to more equitably distribute the rewards of innovation

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Topic:	Entrepreneurship	**Researcher:**	Tomáš Grünwald	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research paper	**Link:**	Link

For our purpose, I propose to focus not only on disabled persons, but include into the inclusive community also those who are excluded based on their social and economic disability.

Relevant strategy for our project seems to be the first-one primarily– technological driven innovations as these activities are facing those who are not currently well-served by innovation and the innovation are led by technological start-ups and private investors.

#3: Inclusive Design: An Overview of Current Thinking

Framework:	Inclusive Design Thinking	**Author:**	Neha Dhoundiyal	**Year:**	2019
Topic:	Entrepreneurship	**Researcher:**	Veronika Krásnohorská	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research paper	**Link:**	Link

With more than 7.5 billion people in the world, our ambition should be to create products that are appropriate for each of them - physically, cognitively, and emotionally. To achieve this goal, we must begin by looking at **human diversity as a resource for better design**.

Products for “average masses” reduces commercial success because of bad press and increased returns and also increases customer-support costs.

Inclusive design guides an appropriate design response to diversity in the population through:

- developing a **family of products and derivatives** to provide the best possible coverage of the population
- ensuring that each **individual product has clear and distinct target users**
- **reducing the level of ability** required to use each product, …to improve the user experience for a broad range of customers, in a variety of situations”

Concept of disability may have previously limited the understanding of the target group need.

Inclusive design impacts designers’ mindsets, methods, and behaviours. “**What we design is a by-product of how we design**. Measuring the benefits includes measuring the shift in our culture and ourselves.”

Everyone should have a sense of belonging – as one of the main needs of margin groups.

Rather than adopting the assumption that accessible technology is useful only to people who have disabilities, developers must consider “the wide range of people who could benefit from using accessible technology. It is essential to understand:

- **the types of difficulties and impairments** [that] people are experiencing [and their degree of severity]
- **the frequency of their occurrence** among current and potential computer users…
- **specific ways** in which accessible technology could help people overcome such difficulties and impairments”

To focus on the different ways how to design product/ service/ process/ technology, not the result itself.

- To have in mind the sense of belonging as one of the main needs of inclusive groups.
- To start from the margin groups when developing product/ service/ process/ technology and then consider the larger scale for usage also by masses.

#3: Inclusive Design: An Overview of Current Thinking (cont.)

Framework:	Inclusive Design Thinking	**Author:**	Neha Dhoundiyal	**Year:**	2019
Topic:	Entrepreneurship	**Researcher:**	Veronika Krásnohorská	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research paper	**Link:**	Link

To focus on the different ways how to design product/ service/ process/ technology, not the result itself.

- To have in mind the sense of belonging as one of the main needs of inclusive groups.
- To start from the margin groups when developing product/ service/ process/ technology and then consider the larger scale for usage also by masses.

#4: Inclusive TedX talks

Framework:	Inclusive Design Thinking	**Author:**	Elise Roy, Sinead Burke, Chris Downey, Mileha Soneji, Ron McCallum	**Year:**	2013, 2015, 2017
Topic:	IT, technology accessibility	**Researcher:**	Veronika Krásnohorská	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Video	**Link:**	1 2 3 4 5 6.

With disability comes different perspective - "When we design for disability first, you often stumble upon solutions that are better than those when we design for the norm."

- Design for extreme consumer, and the norm will follow - OXO peeler, text messages (for deaf people), the rest followed to use it
- When there is disability, **other senses strengthen**
- **To maintain dignity** is a biggest need of misrepresented groups – not to look embarrassing when climbing on a chair, taking an ordered coffee without the lid from high places, not to be seen behind the counter, …
- Want to be seen as a person **not as a disability first**
- **Fear, vulnerability**, they are missing something "the others" have
- Disabled people **want to blend in**

BEST PRACTICES

1. The best way to explore **not to interview, but to observe** the different behaviour - in interview superficial answers, but in observation real behaviours and needs.
2. When there is inclusivity, on the other hand **something better can occur** in the group, better than the norm (sense, ability,).
3. Inclusive **groups do not want to be a burden** or to frustrate other people, when they are not capable of something - they try to overcome it in different ways (frustration from not understanding conversation for a deaf person…solution, reading from lips, finding a rhythm in a conversation and thus understand).
4. **Make smart solutions in simple way** – not a smart-glasses, or a projector, but a sticker on a floor, cup for clumsy person not only with Parkinson etc.
5. Dig deeper, divide task in smaller tasks and try to find a solution on those
6. Try to get to brain in other ways, brain is blind, deaf, just processing impulses - for deaf people created a vest with sensors describing words, in weeks a deaf person is able to understand conversation, In how many different ways you can deliver a sense to brain?

- The best way to explore not to interview, but to observe the different behaviour - in interview superficial answers, but in observation real behaviours and needs
- Make smart solutions in simple way – not a smart-glasses, or a projector, but a sticker on a floor, cup for clumsy person not only with Parkinson…
- Dig deeper, divide task in smaller tasks and try to find a solution on those
- Try to handle "disability" of an inclusive group in different ways

#5: INCLUSIVE INNOVATION ENGAGING END-USERS AS DRIVERS OF HEALTHCARE IT INNOVATION

Framework:	UCD / HCD	**Author:**	JUNGMANN, Sven	**Year:**	2016
Topic:	(e)Health	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	German
Inclusivity:	No	**Type of the source:**	Presentation at practitioner's conference/ fair	**Link:**	Link

Lists current problems in ICT-development for Health and pleads for UCD; provides 4 reasons for developers for inclusion (closeness to reality; culture & rites; joint system understanding; moral duty to enable acceptance) and simplified strategies for inclusive innovation and their application:

1. user empowerment, e,g. by supporting their digital literacy;
2. fostering diffusion by use of 'external' perspectives;
3. nurturing ICT culture by means of communication channels, strengthening early adopters and analyses of underlying social systems;
4. perpetuating inclusion by frequent ICT initiatives and digitalisation committees.

References as main source: Zilgalvis P, Jungmann S (2015) From spectators to change agents: Empowering European citizens as drivers of e-health innovation. Cyber Studies Programme: Working Paper Series, No. 2. University of Oxford,

https://www.politics.ox.ac.uk/materials/centres/cyber-studies/working_paper_no.2_zilgalvis_jungmann.pdf

Gives short practical examples for applying the 4 'innovation' strategies.

Provides roadmap by suggested stepwise approach (iterative to be kept in mind, though).

Described motivation/ problems (user-alienation) and strategies probably domain-independent.

A focus on the disadvantaged groups at the core of our project is missing, therefore the checkbox above is ticked for NO.

#6: Understanding Inclusive Design Education

Framework:	Inclusive Design Thinking	**Author:**	Wilson, Nicky; Thomson, Avril; Thomson, Angus; Holliman, Alexander 'Freddie'	**Year:**	2019
Topic:	Education	**Researcher:**	Eva Malichová	**Language:**	German
Inclusivity:	Yes	**Type of the source:**	Conference paper	**Link:**	n/a

This research aims to understand the current approach to inclusive design education within UK Higher Education Institutions, utilizing interviews with design educators and a student survey. The study concluded that teaching of inclusive design varied between institutions, with conflicting responses from academics and students relating to the methodologies taught. This study recommends that greater transparency should be encouraged between institutions to encourage the development of a cohesive, inclusive design education strategy, in addition to the development of a framework to aid the implementation of appropriate inclusive methods and tools within the design process.

In the next sections, I selected parts of the paper which could be used in our materials: (Statistics of some underrepresented groups; definition of Inclusive Design and its awareness; tools; research results)

Underrepresented groups info:

- Population ageing is a global issue that is set to become one of the most significant social transformations of the twenty first century (United Nations, 2015) with the UN predicting the number of people aged over 60 will grow by 54% by 2030 (United Nations, 2015).
- WHO (2011) report over one billion people live with some form of disability. This raises unprecedented global challenges including increased expenditure on health care, labour force shortages and income security (Bloom et al., 2015) with designers responsible for designing functional and accessible products for a growing, diverse market.

Inclusive design definition:

- A general approach to designing in which designers ensure their products and services address the needs of the widest population possible, irrespective of age and ability (Design council, 2008).
- Looks to provide designers with a more accurate understanding of the requirements of different user groups, with the aim of driving informed decisions throughout the engineering design process (Waller et al., 2015).
- Main objective: to create equality within society through the eradication of social exclusion (Clarkson & Coleman, 2015).

Awareness:

- Awareness of ID in industry is low (Carse et al., 2010). Sims (2003) identified that while 72% of designers were aware of ID, Goodman-Deane et al. (2010) found that many designers did not implement ID routinely.
- Langdon et al. (2015) identified that lack of designer experience in the implementation of ID methods and tools is a significant factor limiting the uptake of ID in industry.
- Implementation of ID is reliant on the education of designers, as they are responsible for its application and expansion in an industrial context (Dong, 2015)
- Education is perceived as the best way to raise the profile of ID, with increased educational participation being more influential than changes to legislation (Carter, 2014).

#6: Understanding Inclusive Design Education

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Topic:	Education	**Researcher:**	Eva Malichová	**Language:**	German
Inclusivity:	Yes	**Type of the source:**	Conference paper	**Link:**	n/a

Tools:

Simulation gloves and glasses – to empathise with users and design more effectively towards their needs

Way of teaching ID and difficulties:

- Approaches to ID education include detailing the key principles of ID (MacDonald, 2006) followed byclass exercises and projects to encourage students to utilise ID methods and tools in practice (Herriott & Jensen, 2013). However, there are difficulties in educating designers in ID, which are summarised by Dong (2010).
- Large class sizes make the teaching of the fundamental ID principles difficult to express and practice.
- Logistical difficulties in achieving the multi-disciplinary teams advised for ID activities.
- The requirement for ethics assessments within design classes makes the implementation of user interaction activities more challenging.
- A lack of successful ID case studies with which to convey the basic principles of the approach.
- Distinguishing the difference between ID and design for special needs within a design program.
- Encouraging students to consider all of their senses when designing inclusively, rather than concentrating solely on physical aspects.

Results of their research in the field of ID education:

- 3 of 4 universities do not teach ID as a specific module, but as a part of multiple user-centred design classes

Table 2: ID methods and tools taught across universities

Participant	ID methods and tools taught
Participant A	Cambridge engineering gloves, simulation glasses and sensory bag. Limited use of Exclusion Calculator, ethnography, participation and observation.
Participant B	Inclusive Design Toolkit, students advised of online resources, impairment glasses, gloves, "third age suit".
Participant C	Cambridge engineering gloves and simulation glasses.
Participant D	Personas, occlusion devices, constraint devices, Exclusion Calculator.

#6: Understanding Inclusive Design Education

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Topic:	Education	**Researcher:**	Eva Malichová	**Language:**	German
Inclusivity:	Yes	**Type of the source:**	Conference paper	**Link:**	n/a

Authors recommendations how to teach ID engineering students:

- ID should be taught in early years as a specific module - either stand-alone or as part of a wider user centred design module - to enhance student understanding and awareness of ID and clearly distinguish ID from other user centred approaches. Curriculums should emphasise the benefits, barriers and basic principles of ID.
- Early year ID modules should utilise a basic framework (e.g. the ID framework proposed by Wilson, 2017) to structure the class. An ID specific framework will encourage diversity of user in the design process, in addition to the use of appropriate tools and methods at relevant stages within the design process.
- Later years should encourage implementation of ID within industrial design projects, as an integral part of good design practice.
- In line with higher educator recommendations ID methods and tools should form part of a holistic user centred design approach without the need for a prescriptive framework in later years.

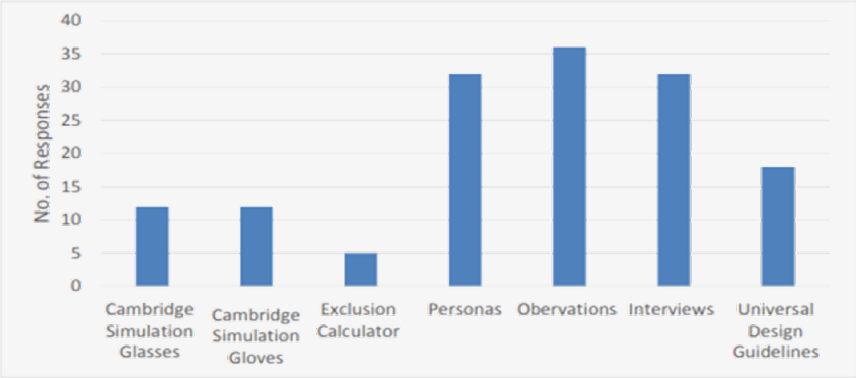


Figure 2: Research methods and tool utilisation

- Use of definitions and explanations in our introduction part
- There are some recommendations how ID should be taught, we can discuss or use some of them

#7: Inclusive Digital Education

Framework:	Inclusive Design Thinking	**Author:**	European Agency for Special Needs and Inclusive Education	**Year:**	2022
Topic:	Digital Education	**Researcher:**	Eva Malichová	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Book	**Link:**	Link

Book focusing on information and communication technology and digital media and their use to enable, support and improve inclusive teaching and learning. It also examines implementation projects and conferences in the education field to discover whether and to what extent findings from the field of science are reflected in (or close to) practice.

Selection of key messages from the book:

- The development of inclusive technology should consider technology-centric or technology-driven approaches and the primacy of pedagogy (i.e. priority is always given to pedagogy over all other considerations) in a balanced way
- User-centred design approaches embracing the concept of universal design avoid disadvantages from the outset. Assistive technology should be used as a compensatory means only where universally designed technology does not (yet) sufficiently satisfy all users' needs.
- Open educational resources (OERs) are explicitly intended to improve accessibility to teaching materials.
- Artificial intelligence (AI) applications are available to support teaching children with autism, with learning disabilities or with sight or hearing problems
- Inclusion in digital education is a multi-dimensional phenomenon, which is affected at least by society, technical equipment, the educational institution, the learning situation and the individual learners.
- When designing conditions conducive to inclusion in digital and analogue educational settings, it is necessary to combine the insights gained from different individuals or groups vulnerable to exclusion to derive measures for a holistic perspective on inclusion for high-quality education for all learners.
- Teachers need support in selecting inclusive teaching materials that present no or few barriers and are suitable for all learners.

Discriminatory grounds:

- Gender, remoteness, wealth, disability, ethnicity, language, migration, displacement, incarceration, sexual orientation, gender identity and expression, religion and other beliefs and attitudes (UNESCO, 2020)

ISO Norms to check:

- ISO 9241-171:2008 'Ergonomics of human-system interaction — Part 171: Guidance on software accessibility', which focuses on interactive systems and on promoting increased usability of systems for a wider range of users (International Organization for Standardization, 2008).
- ISO 9241-20:2021 'Ergonomics of human-system interaction — Part 20: An ergonomic approach to accessibility within the ISO 9241 series', which provides guidelines to improve the accessibility of ICT equipment and services for people with a wide range of sensory, physical and cognitive abilities, including those who are temporarily disabled, and the elderly (International Organization for Standardization, 2021).

Book also contains comparison of technologies used in inclusive education with their advantages (page 28) and table with vulnerability to exclusion in digital education (page 41).

#7: Inclusive Digital Education

Framework:	Inclusive Design Thinking	**Author:**	European Agency for Special Needs and Inclusive Education	**Year:**	2022
Topic:	Digital Education	**Researcher:**	Eva Malichová	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Book	**Link:**	Link

Recommendations for curriculum development:

- Provide information through multiple means of representation (present information and content in different ways)'
- Provide multiple means of action and expression (differentiate the ways that learners can express what they know)'
- Provide multiple means of engagement (stimulate interest and motivation for learning)' (European Agency, no date).
- Graphic design of the book

- A lot of information can be used in our materials – mainly related to digital education
- Graphic design

#8: Factors that influence the implementation of information and communication technology inclusive design practices in organisations

Framework:	Co-creation / Co-design	**Author:**	Ebrahim, F. and Kabanda, S. and Mthwazi, G.	**Year:**	2022
Topic:	ICT	**Researcher:**	Eva Malichová	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Conference paper	**Link:**	Resarchgate

The study seeks to identify and understand the factors (the perception of diversity, and how it influences team performance, management support, cost, and organizational culture. The implications of these results were discussed that influence the implementation of inclusive design practices in organizations. The first part focuses on the definition of inclusive design and its gaps in ICT and also factors influencing inclusive design (such as team diversity, management support, and organizational culture). The second part is focused on research.

Inclusive design in ICT - information and communication technology artifacts that are accessible and easy to use for as many people as possible. Human diversities must be considered when producing these inclusive design artifacts.

Inclusive Design (ID) has been advocated for in the development of ICT artifacts that are accessible and easy to use by the broader population (Steward, 2020). Inclusive design is not only important in the lives of abled people but also extends to people with disabilities, the elderly and anybody who feels challenged by ICT artifacts. The inclusive design approach is traditionally perceived as an innovative strategy of building software solutions that meet the needs and capabilities of a diverse entire population (Mosca et al., 2018). Designers should not only possess technical skills, but also have both listening skills and empathy to produce effective design outcomes (Galford et al., 2015).

Methods that calculate design exclusion, i.e., what percentage of the population is excluded from using a product based on its features' (Correia de Barros, 2022)

Research results:

- Inclusive design methodologies were perceived to add an extra burden to the design and development process, which affected the time to market of the product.
- most of the existing solutions were not designed with the inclusive design approach in mind, and if they are to reconsider doing so, then most of their business processes will have to be reengineered.
- an environment conducive to the team should be fostered to enable inclusive design implementation. The organisation should embrace the differences the team members bring to the team.

Creation of teams to ensure teams diversity?

#9: ThessAHALL—A Life-Long Learning Programme for the Social Inclusion of "Early-Stage" Older Adult Researchers

Framework:	Co-creation / Co-design	**Author:**	Despoina M, Evdokimos K, Petsani D, Kyriakidis N Zilidou V, Sidiropoulos E et al.	**Year:**	2016
Topic:	(e)Health; science	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Part of SISCODE H2020 project proceedings	**Link:**	Link

Aiming at limiting the risk of ageism and social exclusion of older adults in society, the Thessaloniki Acive & Healthy Ageing Living Lab (Thess-AHALL) looks at co-design and open science solutions for social inclusion for the ageing population. The chapter presents the "Partners of Experience", a participatory life-long learning programme, consisting of a series of co-creation research and experiential learning activities in the Thess-AHALL Living Lab, part of the Medical Physics Lab, School of Medicine of the Aristotle University of Thessaloniki (AUTH), and the City of Thessaloniki that encourage cooperation between older adults and the R&D scientific community of the University.

Gives practical examples for Co-creation journey (resulting from feedback from 10 co-creation labs/ Living Labs across Europe) and "co-creation activities" (panel sessions, ideation, desk research, field visits, intergenerational collaboration, mentoring, etc.).

Suggests and tests methodology with 5 steps.

Describes proven corresponding methods, see above, some also for distance settings (because of COVID), and in a scientific domain.

A focus on a disadvantaged group (here: elderly people) as we pursue.

#10: Conclusion: Co-creating Inclusive Digital Futures

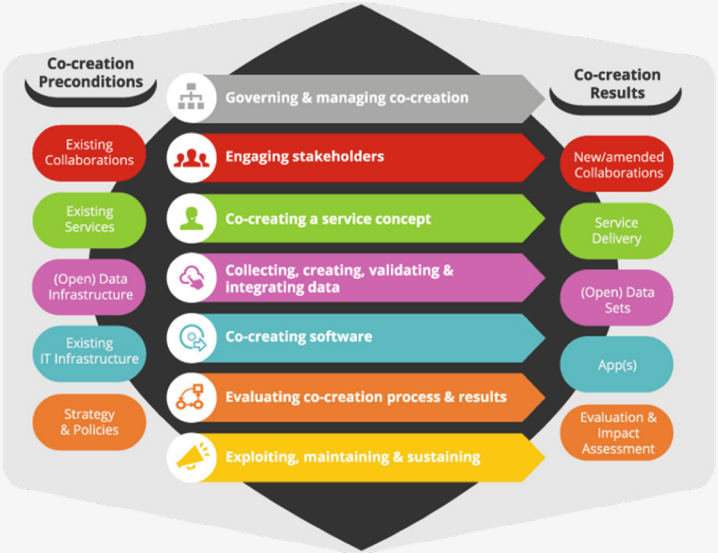
Framework:	Co-creation	**Author:**	Jarke, J.	**Year:**	2021
Topic:	eGovernment / public administration	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	eBook	**Link:**	Link

Relating to the governing of co-creation and the sharing of control—co-creation is indeed an appropriate method to develop digital public information services that meet the needs of older users and achieve an output that is better than existing, comparable services. The second conclusion—relating to the sharing of expertise and knowledge—is that the co-creation of digital services works well with older adults, including those with little or no digital literacy skills. The third conclusion—relating to enabling change—is that not every digital public service is equally suited for co-creation. Co-creation may become a way to improve the lack of user-centricity and user experience of digital public information services. It is a complex multi-task and multi-stakeholder process, more demanding than traditional citizen participation. Due to the openness and complexity inherent to any co-creation process, providing strict guidelines and recommendations is not possible. However, the learning points identified in this book provide evidence on ways to co-create better, more user-centric public services with and for older adults.

The requirements and scope of co-creation processes go beyond approaches such as co-production, co-design or civic open data use. Co-creation of digital public services demands a different set of engagement methods than traditional co-production approaches. The co-design of digital public services, however, comes with its own challenges—in particular when engaging older and/or non-tech savvy citizens. Co-creation also goes beyond approaches to co-design, because such approaches are mostly limited to the design of intra-organisational information systems or stand-alone applications. Co-created digital public services however, need to be sustainably provided and maintained for all citizens. Co-creation also goes beyond the civic use of open data, because it is based on a collaborative relationship between service and data providers on the hand and a broad range of citizens on the other.

Gives practical examples for inclusive user-centric journey (resulting from feedback from 3 co-creation initiatives in Germany and Spain) and “framing conditions” and results of co-creation projects (cp. Figure) with a focus on a disadvantaged group (here: elderly people) as we pursue.

Defines proven corresponding fields of action, see above, in a service-oriented domain.



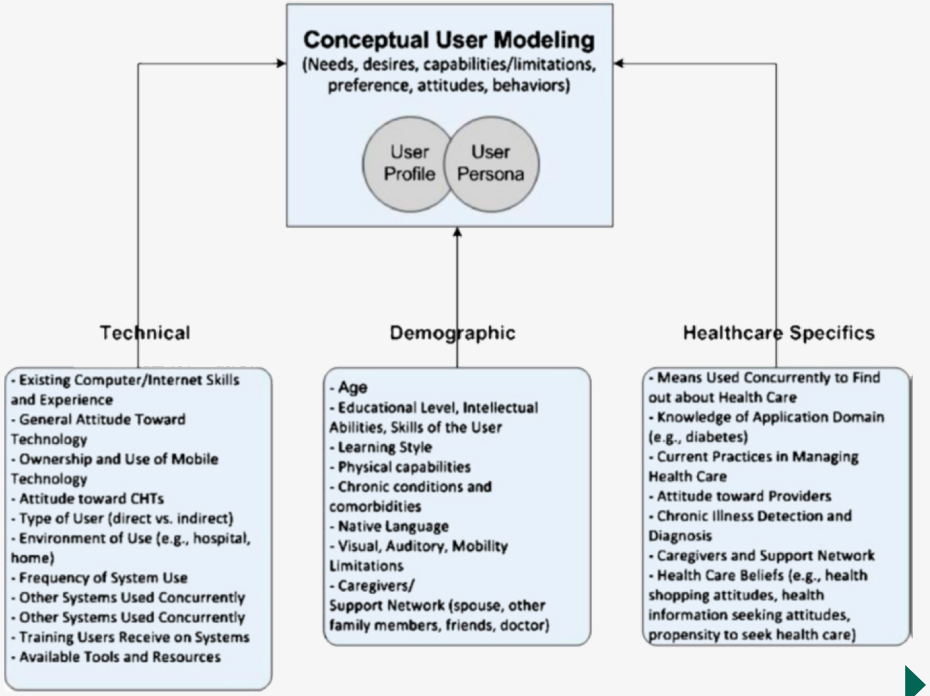
#11: User profiles and personas in the design and development of consumer health technologies

Framework:	UCD, Action Research	**Author:**	LeRouge, Cynthia; Ma, Jiao; Sneha, Sweta; Tolle, Kristin	**Year:**	2013
Topic:	eHealth / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link (abstract only)

The main objective of this research is to investigate the user-centered design (UCD), specifically user profiles and personas, as methodological tools to inform the design and development of devices for an aging population. Our work begins to fill this void in three ways. We (1) illuminate the process of developing user profiles and personas for a elder population with the hope that the resulting profiles and personas may be used as foundational material for informing the design, development and evaluation in other similar contexts; (2) call attention to how to further enhance and complement traditional user profile and persona techniques for design by integrating cognitive structures and present behavior that drive health care thinking, future behavior and demand; (3) show how the profiles and personas can be used to inform requirements, design and implementation decisions for a technology aimed at facilitating adoption and diffusion for the elderly.

The results from the study show that user profile and persona can be valuable. The demonstration of techniques used in this study can serve as a guideline to developers in bringing conceptual user modeling into the design of software interfaces targeted for users with specific health care needs. Specifically, the study provides guidance on the creation and use of profiles and personas to tap into the conceptual models of the targeted elderly population reflecting their preferences, capabilities and attitudes towards using technology. Insight into the mental model of the aging group has been shown to inform later stages of UCD development (e.g., the creation of prototypes and usability testing) as well as implementation and adoption strategies.

Gives practical examples for (in my opinion inclusive) user-centered approach, e. g. a conceptional model with technical and demographic details for an elderly target group.



#11: User profiles and personas in the design and development of consumer health technologies

Framework:	UCD, Action Research	**Author:**	LeRouge, Cynthia; Ma, Jiao; Sneha, Sweta; Tolle, Kristin	**Year:**	2013
Topic:	eHealth / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link (abstract only)

Practices, see above and below, in a service-oriented domain:

- Explicates process for developing user profile and personas as part of UCD.
- Captured the mental model of a specific user segment via user profiles and personas.
- Demonstrated user profiles and personas can be leveraged in the design, development and implementation phases so that eventually adoption and use.

#12: Usability of Clinical Decision Support Systems

Framework:	HCD	**Author:**	Mucha, Henrik; Robert, Sebastian; Breitschwerdt, Rüdiger; Fellmann, Michael	**Year:**	2022
Topic:	Medicine / decision support systems	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:		**Type of the source:**	Research article	**Link:**	Link

… many if not most expert systems—especially in health care—fail to deliver the degree of quality in terms of usability that its expert users are used to from their personal digital consumer products.

We make a point for usability to be considered a major success factor and non-negotiable characteristic of expert software. With software evolving into virtual coworkers in terms of supporting human decision-making in complex, high-risk domains, the necessity of and demand for systems that are unambiguously understandable and interpretable for their expert users have never been higher. We show that this is a real-world problem with high practical relevance by describing our work in the domain of clinical decision support systems (CDSS) as an example. …

We continue by explaining why usability must be regarded as a major goal in software development. We derive challenges and opportunities that may well be transferred to other domains. Finally, be including a real-world example from our own professional work we propose a practical approach …

Gives practical hints for human-centered/ participatory design approach, e.g.

- For Data collection, e.g., **interviews and field research**, in the actual context of use and with actual users as basis (however, not enough, see below)
- Underscores that **design problem** is that designers must develop the ability to synchronize the conceptual model of a given [IT application] with the user's mental model of that very same system,
- Suggests **advanced systematic prototyping and testing**. (observation and verbal inquiry not enough!).
- Even though not really featuring inclusivity regarding marginalized people or communities in the paper, motivates **for Participatory design** and co-design where it comes to empowering those groups like patients (actively engage future users!);
- (a challenge when working with experts that the **time of the expert is very precious** and thus a scarce good): Includes and **shows the concrete approach** by means of pictures (Fig. 1+2)

Practices including examples for process and outcome, see above and below:

- Shows developing a system in a participatory way as part of HCD (chapter 4), including **Interface Sketching Workshop** (pictures from card sorting phase and user-generated interface design solution as basis for professional ideation).

#13: Adapting UCD for Designing Learning Experiences for Romanian Preschoolers. A case study

Framework:	UCD / participatory design	**Author:**	Adriana-Mihaela Guran, Grigoreta-Sofia Cojocar and Anamaria Moldovan	**Year:**	2019
Topic:	(early) education: SW for developing digital skills	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

Living in a world where almost every aspect of life becomes digital requires attention on digital skills development of young generations of citizens. Education is the driving force that can support equality of chances in digital skills acquirement. In this paper we describe our experience in developing educational software for Romanian preschoolers (3–5/6 years) attending the public formal educational system. To be successful, the educational software should be both accepted by preschoolers and their teachers. We propose a two steps User (Child) Centered Design (UCD) approach focusing both on preschoolers and their teachers. The results obtained by applying the proposed method on a real case study are presented.

Designing and developing educational applications for preschoolers brings major challenges: designing for preschoolers and ensuring the educational nature of the products. The first challenge is determined by the lack of design guidelines for this particular age range. … In order to achieve the educational goal, we knew from the beginning that the participation of an expert in children education is mandatory.

Gives practical examples for (in my opinion inclusive) user-centered approach, e.g. methods for a very young target group which cannot fully participate whereas design should be paticipatory:

- Integrates surrogate user(s) (kindergarten teachers e.g. since sketches and wireframes too abstract to be understood by the children and too time-consuming to make them understand and generate new ideas) for development (teachers interviewed for ‘product design‘/ requirements, children as target users still included as informants, though; use of accompanying observations and prototyping: see above) and for validation during adapted UCD.
- Suggests alignment with curriculum** and game applications/ playful approach [including rewards since main activity is playing; poems, rhymes, a story **] to achieve goals!
- Tests also with actual users (the children, including simple question-interviews**), however! Showed need of
  - Virtual characters that would welcome in the application’s world, shortly presents the available functionality and how it is accessible, and guide them through the learning/interacting process.
  - Precise formulation of tasks/ steps (including hardware to be used like mouse, screen) instead of abstract terms.
  - ** should not require written input or produce written output **
- Drawback of performed heuristic evaluation is that where it was performed by colleagues of the kindergarten teacher, a common organizational culture may have influenced the results.

**cp. the authors’ other participatory design article on that very project in the same proceedings (pp. 333-337): https://cardiffuniversitypress.org/site/books/10.18573/book3/read/?loc=055.xhtml

#13: Adapting UCD for Designing Learning Experiences for Romanian Preschoolers. A case study

Framework:	UCD / participatory design	**Author:**	Adriana-Mihaela Guran, Grigoreta-Sofia Cojocar and Anamaria Moldovan	**Year:**	2019
Topic:	(early) education: SW for developing digital skills	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

The final users, here, lack some cognitive and physical skills that would empower them to actively participate through all the steps in the design process (**however, they can in one way or the other participate during almost any phase: during requirements as informants, during prototyping as users and informants, and during evaluation as users and testers. The only step where they haven't been involved was initial design. Potentially, they could play a more significant role as design partners, but only if they are accompanied by an expert in the educational field**). Thus being **a potential sample for other disadvantaged groups** like **illiterate, mentally or physically handicapped** persons, e.g. when computer mouse cannot be used notwithstanding be held.

Addresses lack of **evaluation tools** targeting particular groups, here, the preschool children, by use of proxy** or surrogate users (experts closely related to the users, here teachers) or **simple means like smileyometers**,

Conclusion that UCD is basically feasible even for such special group like small age users, but needs some adaptation.

Particularly interesting because from EDUCATION context.

#14: Applying Participatory Design with Users with Intellectual Disabilities

Framework:	UCD based on participatory design	**Author:**	Abascal, Julio; Arrue, Myriam; Pére, Juan Eduardo	**Year:**	2019
Topic:	Social network	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

… presents an experience of participatory design with people with intellectual (cognitive, physical or sensory) disabilities. The main goal was to create a Sheltered Social Network intended to train those people in the use of social networks and to allow the early detection of any type of danger they could face when they use a regular social network.

In the first phase, they designed a strategy to allow the users to participate in the discussions without restrictions or barriers.

In the second phase, they successfully applied this strategy in order to develop the Guremintza social network.

Gives practical examples for (in my opinion **inclusive**) participatory approach, e.g. methods for a very special target group which cannot fully participate as during 'usual' design because of **cognitive, physical and sensory disabilities**.

Following participatory design principles with the **close participation of the users** in order to collect their objectives, interest, likes, and restrictions.

Users with intellectual disabilities (here Down syndrome or mental disabilities) require special procedures that allow the eliciting of requirements while trying to avoid asking **direct questions impossible** for some of them to answer because of cognitive restrictions. **Rewording and other ways (here: use of mock-ups) to facilitate easy answers** is mandatory!

Even though experienced in the use of computers, targeted persons **tend to remain silent, deviate their interventions to other topics and provide positive answer** to all the questions: reason was intimidation by 'alien' technicians and therefore they were not behaving as usually. Therefore, procedure conceived with two separately meeting boards:

- A **Users Board** including targeted users and staff from their care institution for making design decisions and protype validations.
- A multidisciplinary Designers board (incl. the corresponding staff from the Users Board) **avoiding any type of manipulation** of the decisions made by **the Users Board** (when their proposals could not be implemented they were asked to select an alternative). Together, they specialize in 3 groups (as 1-4 persons in project) in charge of 1. conception, accessibility, usability, usage data management, coordination, dissemination; 2. development, implementation, maintenance; 3. for the assessment on user needs and coordination with the Users Board (exchange of results vice versa).

Additionally, **training / supervising** people in the use is **appropriate**.

Conclusion:

• Participatory design with people with cognitive disabilities is possible, provided that **adequate procedures** are designed to collect their opinions.

• Participation of the users in the design allows a progressive development based on users' needs and capabilities, always ensuring their understanding of the application.

• This method minimizes the possibility of including barriers that are rooted in the basic design and, therefore, cannot be removed.

• Participatory design increases the users' affinity to the resulting application and increases its usage.

#14: Applying Participatory Design with Users with Intellectual Disabilities

Framework:	UCD based on participatory design	**Author:**	Abascal, Julio; Arrue, Myriam; Pére, Juan Eduardo	**Year:**	2019
Topic:	Social network	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

The final users, here, lack some cognitive skills that would empower them to actively participate as in usual design process. Thus being a **potential sample for other disadvantaged groups**, esp. other **intellectually disabled** persons.

Also focuses producing a multilingual application (could in my opinion be interesting for services for migrants, for instance)

Shows that participatory design was successfully feasible even for such special groups, but needs some adaptation of procedures with **assistance of educators and care staff**. [surrogate users as in source 013_Guran]

#15: Software Development and Deployment

Framework:	UCD	**Author:**	Rooksby, John	**Year:**	2011
Topic:	Socio-technical syst.; rather large-scale IT projects	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:		**Type of the source:**	Handbook	**Link:**	Link

Systems development is more than a technical procedure; it is a form of cooperative work. The development of any non-trivial system involves various kinds of planning and procedures, necessitates forms of distributed coordination work and requires some subtleties amongst workers in the form of awareness of the work of others. These practices are intricate and fine-grained and saturate every level of software engineering from coding, to testing, to documenting, to procurement and marketing.

Gives practical examples for **problems** particularly occuring during UCD (resulting from 20 years of experience of editor/ author) esp. during Requirements engineering

User participation: The reality tends to be that where **users** are involved, these are often the 'expendable' people within an organisation (i.e. **the ones with enough time to participate**) and they **find it very difficult to articulate what it is they want** from a system. **Participatory design is often also abandoned as deadlines start to bite**. Users are often also involved in **testing systems, but this seems to get conflated with training**, which can mean neither is done properly.**

Customer participation: The user and the customer are rarely the same. While the rhetoric is systems engineering is often about user centeredness, the reality is that systems engineers must **prioritise satisfying the customer**. The customer's priorities can often be more associated with cost and deadlines than with usability.

User and customer proxies: In many cases, the user or customer is not actually available and so will be simulated. This may be through the creation of **user models but** is more commonly done through someone acting as a proxy. In particular, product companies do not always have a pre-existing customer base (and even if they do, need to focus on the expanding the market to other customers) and so some member of the development or marketing team will usually stand in for the customer.

Typification: Whether users participate or not, a substantive part of a systems project involves **speculating** and reasoning about what users might do with the system. Where no genuine user is available, this will involve talking about what users may do. Where users are available, that user still needs to reason about what they might do with the system and how representative they are of other users.

Pervading the user-designer relation in systems development are **issues of generalisation**. How does one person's needs and opinions generalise to others? How do the issues in one organisation generalise to the issues in others (as potential customers)? Systems engineers, even if they have "users" to hand, will inevitably have to engage in some practical **social reasoning** about how to satisfice the needs of users.

** Sommerville himself restricts in neighboring chapter (that is particularly on Requirements) that "fieldwork, which is shared with **user centred approaches to requirements** such as those used in agile methods, is that it is mostly concerned with work as done by users. It is therefore **less useful for understanding broader organisational requirements** or what are sometimes called **'non-functional' requirements** – dependability, security, compliance, etc." (https://archive.cs.st-andrews.ac.uk/STSE-Handbook/RequirementsandDesign/index.html)

#15: Software Development and Deployment

Framework:	UCD	**Author:**	Rooksby, John	**Year:**	2011
Topic:	Socio-technical syst.; rather large-scale IT projects	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:		**Type of the source:**	Handbook	**Link:**	Link

Creating awareness of **development as a socio-technical process and** the aforementioned **general problems for UCD** (Requirements Engineering!), in a nutshell:

- Finding and keeping appropriate/ helpful targeted users (or their proxies) in the loop
- Lack of non-functional requirements identified
- Speculation or difficult reasoning about users actual intentions for a system
- Customer (pays attention to costs) > user (pays attention to usability)
- Testing not handled independently enough from (a good) training

Need to (in worst-case project-specifically) identify adequate corresponding counter-measures!

Of, course, user proxies (surrogates) or at least user models instead of not having users at all are appropriate in general.

#16: User-centred iterative design to develop an evidence-based communication application for maternity care

Framework:	UCD	**Author:**	Stevenson JE, Oscarsson M	**Year:**	2021
Topic:	eHealth / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	No	**Type of the source:**	Research article	**Link:**	Link

A record number of immigrants, many Arabic speaking, arrived in Sweden during the years 2015/2016. Immigrant women have a higher risk of pregnancy complications than native European women and cultural and communicative problems have been identified as a cause of such disparities. Maternity services are under pressure because of language and cultural barriers. Language translation programmes are sometimes used but these are not evidence-based so are not considered safe for use in maternity care. The aim of this research was to create an evidence-based app for communication with Arabic-speaking women in maternity care. User-centred iterative design was used to develop an evidence-based, fit-for-purpose app. Data were collected from midwives in a focus group interview, field observations and workshops. The iterative approach resulted in an evidence-based prototype that is currently being tested in the field.

Suggests proven user-centered approach (with immigrant women bringing along language and cultural barriers under maternity care* as beneficiaries, not as direct users of the multilingual app), see below that is complemented by a timeline It also describes the methods applied in detail.

* Immigrant women have a higher risk of birth complications than native Europeans!

See apporach above that should be transferrable to other disadvantaged groups at least in healthcare settings, e.g. where language barriers play a role (and where professional proxy users available). Communication challenges and general health advice is also described.

Might also be of interest for other app development projects in related domains.

#17: Paving the Way for Patient Pathways: Synthesizing a User-Centered Method Design with Results from a Systematic Literature Review

Framework:	UCD	**Author:**	Richter, Peggy; Schlieter, Hannes	**Year:**	2020
Topic:	eHealth / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

Patient pathways are recognized as a valuable governance instrument to increase standardization, quality, comparability, and transparency of care in comprehensive care networks. Yet, methodological support is lacking. This paper aims to support their development, implementation and continuous maintenance. Therefore, a systematic literature review of existing pathway methods was conducted and a consolidated pathway framework was derived. The framework was complemented by additional steps specific for patient pathways, which were derived in workshops with potential end users of the method proposed. Therefore, a qualitative content analysis was conducted. The additional steps emphasize the longing for generic patient pathway templates and their adaptation to national, regional, and local conditions of care networks. This work is a step forward towards standardized patient pathway development, their large-scale implementation and digitization. In the next step, the proposed method will be applied and tested in the European iPAAC Joint Action addressing innovations in cancer control.

Provides (cancer) patient pathway development **method** (Tab. 5 + Tab. 3) **out of user-centered approach** (with aspects derived from a workshop with potential users where participants formulated user stories to describe requirements for a patient pathway method).

The patients themselves were represented by healthcare providers during method development, but are of course beneficiaries from a special user group with ‘needs other than artifact development’. From that perspective, the approach has an inclusive effect, at least.

See approach above that should be transferrable to development of other methods, not only for (chronic) healthcare context (its resulting method will be part of an official EU-wide certification program!).

Describes user story creation and method validation well

#18: Maximizing Opportunities for User-Centered Design in Acute-Care: Introducing the Focal Wall

Framework:	UCD	**Author:**	Risling, Tracie; Baerg, Krista; Tupper, Susan; Chartier, Lori	**Year:**	2021
Topic:	eHealth / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

Digital health is a promising development in the pursuit of patient centered care. Technological developments, like patient portals, are providing new opportunities for patients to engage in their own healthcare journeys, increasing access to health data and practitioners in many cases. The primary objective of this research is the establishment of an in-patient portal for a new children's hospital through a collaborative design process. This paper details experiences from the first phase of this multi-year project and in particular methodological solutions that have been developed in order to meet the challenges of engaging acute care patients, families, and practitioners in user-centered design within such a demanding context.

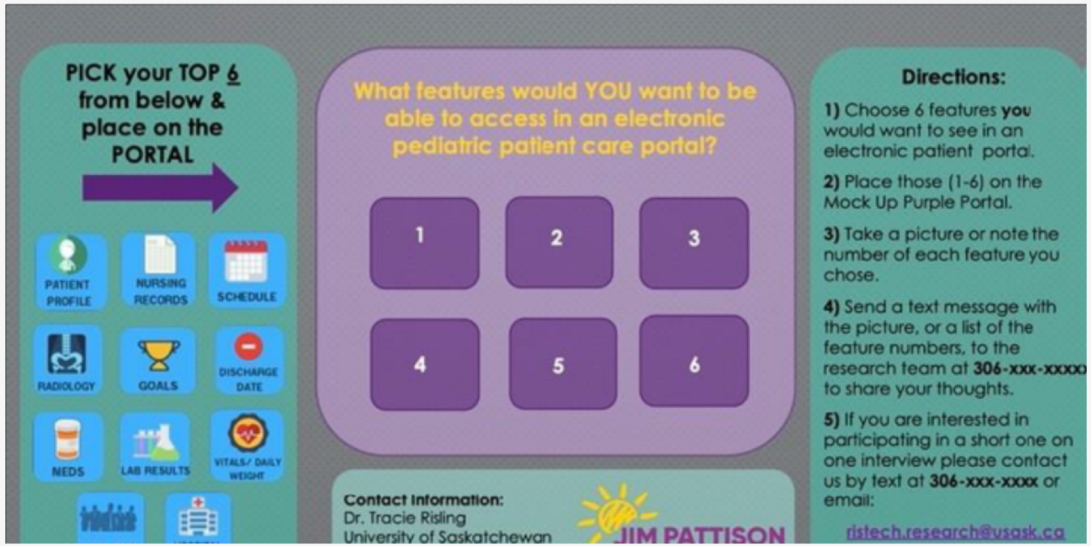
To overcome the constraints of traditional qualitative semistructured interviews we pursued the development of a five-minute digital download [cp. Risling et al. 2019 in International Journal of Qualitative Methods https://doi.org/10.1177/1609406919833482]. Essentially, instead of a standard interview format, five focused questions were delivered through multiple stations set up in different units in the setting. Equipped with tablets, participants would complete a consent, be guided through the questions, recorded by the tablet, and typically be completed on average within five minutes. This approach proved extremely effective on in-patient units as well as the hospital's outpatient clinic ..

Shows pediatric acute care patient portal development method out of user-centered approach with healthcare providers and **patients / families**: aspects were derived from

1. A guided question tour ("digital download session", see Abstract) through care units and
2. Esp. an (offline!) **'focal wall'** in rooms where waiting for appointments or intensive care visits etc. There, participants can determine their preferences for **portal design** and send a picture of it to developers via their smartphone: The **walls** were constructed **out of coroplast** material **depicting a large mock-up** of the patient portal (Figure). A short set of instructions directed participants to select their top six portal features from a set of nine labelled images that depicted: 1) Test and lab results; 2) Healthcare team names and pictures; 3) Patient care plan; 4) Calendar reminders; 5) Health record data; 6) Hospital navigation and procedures; 7) Medication information; 8) Patient vital signs; and, 9) Communication connection to healthcare team.
   These items were **chosen following analysis of** data obtained through the **five-minute digital download sessions**. The participants **moved their selections into the middle section of the focal wall** where they were secured by velcro and then **texted a picture of the wall chosen (or six numbers representative for the functionalities where restrictions to image submission) to the research team**. Everyone who submitted an image was provided with a five-dollar **coffee card** from hospital vendor.
3. Participants from 2., also were asked and 60% ofthem willing to join follow-up interviews in style of 1.

#18: Maximizing Opportunities for User-Centered Design in Acute-Care: Introducing the Focal Wall

Framework:	UCD	**Author:**	Risling, Tracie; Baerg, Krista; Tupper, Susan; Chartier, Lori	**Year:**	2021
Topic:	eHealth / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link



See approach above that – even though a **unique UCD approach** to that date – could be transferrable to development of other at least in-patient or out-patient applications.

Focal walls can be a substitute/ supporting method in hospital or other institutional settings **where interview formats or focus groups/ storyboarding sessions not easily feasible**. Besides waiting rooms, staff rooms (kitchens?), playrooms or teen lounges recommended.

The young patients themselves were partly represented by **proxy** family members during development, but are of course beneficiaries from a special user group with 'needs other than artifact development'. From that perspective, the approach has a very inclusive effect.

The prominence of the focal wall installations also instigated technology conversations acting as a **primer for the change dialogues that would have to accompany any large-scale institutional adoption like a patient portal.**

#19: Foundations for designing user-centered systems: What system designers need to know about people

Framework:	UCD (HCD)	**Author:**	Ritter, Frank E.; Baxter, Gordon D.; Churchill, Elizabeth F.	**Year:**	2014
Topic:	ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	No	**Type of the source:**	Textbook	**Link:**	Link

"Foundations for Designing User-Centered Systems introduces the fundamental human capabilities and characteristics that influence how people use interactive technologies. Organized into four main areas—anthropometrics, behaviour, cognition and social factors—it covers basic research and considers the practical implications of that research on system design. Applying what you learn from this book will help you to design interactive systems that are more usable, more useful and more effective.

The authors have deliberately developed Foundations for Designing User-Centered Systems to appeal to system designers and developers, as well as to students who are taking courses in system design and HCI. The book reflects the authors' backgrounds in computer science, cognitive science, psychology and human factors. The material in the book is based on their collective experience which adds up to almost 90 years of working in academia and both with, and within, industry; covering domains that include aviation, **consumer Internet**, defense, eCommerce, enterprise system design, **health care**, and industrial process control."

Provides several **frameworks** for developing the critical knowledge and skills required for the design of user-centered systems. [note: esp. **for characteristics of humans/ users** in Part II, but also for **evaluation methods** in Ch. 13/ part III]

Contains **hands-on exercises and examples** to illustrate the application of concepts introduced within the text.

Designed for system designers and developers as well as university students, based on the combined backgrounds of the authors that includes many years working in industry and academia.

Given its

- Applied character,
- Experience included from **domains fitting our target group (e.g. healthcare)** and
- Case studies
- As well as the focus on human cooperation and **suitability for students** (in Ch.8 on teamwork focusing knowledge, skills or abilities, the latter in terms of "Attitudes" according to Barry Boehm, Software Engineering pioneer),

It can be **useful basis to our project eduIDT**. Especially since free sets of materials (slides, but also Pub Quiz, many links to related work, etc.) are available.

According to famous Software Engineering lecturer Ian Sommerville it could be a basis for courses in **human-centered software engineering / system design**.

It makes this very **interesting** for adjusting/ **providing teaching materials out of eduIDT**.

#20: Engineering AwarenessTM: An e-Service Design Approach for Behavioral Change in Healthcare and Well-Being

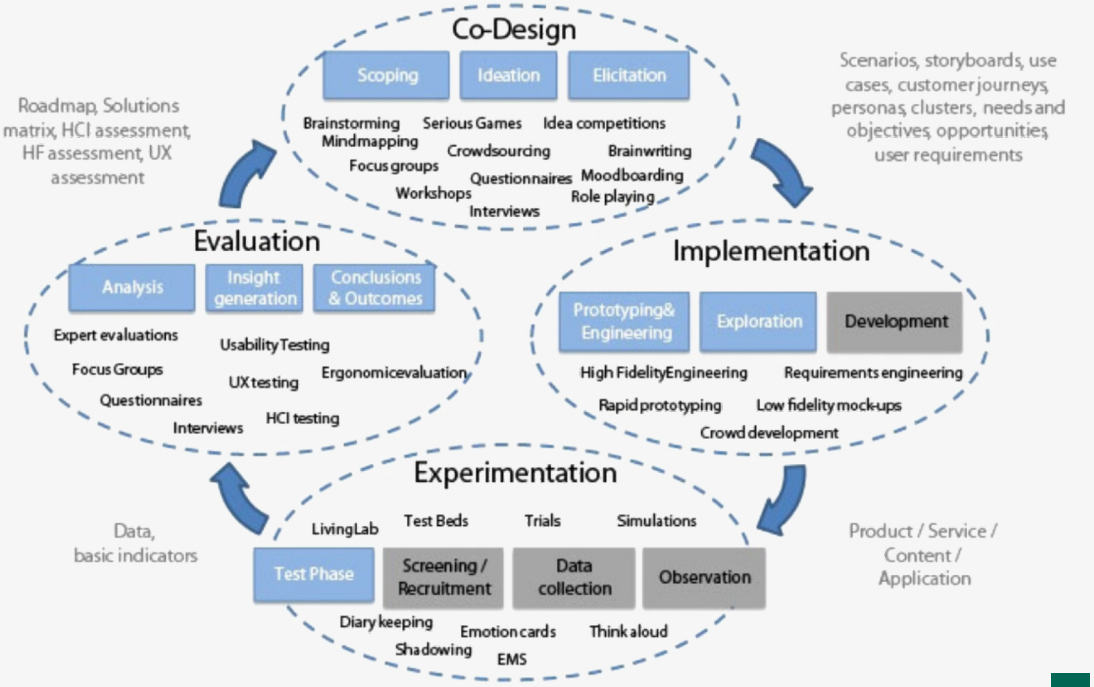
Framework:	Co-creation / co-design	**Author:**	Sanna, Alberto; Vicini, Sauro; Bellini, Sara; Baroni, Ilaria; Rosi, Alice	**Year:**	2013
Topic:	eHealth / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

Personalized interventions that empower users through pertinent and reliable information alongside ubiquitous and user-friendly services can provide them with the opportunity of adopting healthy lifestyle choices which improve quality of life and help prevent a vast number of chronic diseases. The eServices for Life and Health research unit alongside the City of the Future Living Lab strives to apply an e-Service Design approach to deploy innovative ICT and multi-device based services, aimed at truly responding to user needs and aspirations – both inside and outside hospital walls.

Provides relatively comprehensive **overview of** various **methods** (Fig. 3) **out of user-centered** (City of Future) **Living Lab approach** beyond focus groups, personas and questionnaires.

The approach has been targeting **chronically ill persons or (hospitalized) children** and been applied / proven across various international (EU)/ Italian projects for design of different eServices.

See toolkit above that should be transferrable to use for development of other services, not only for healthcare context, but to other disadvantaged groups at least in urban environments.



#21: Eliciting Information Needs of Child Patients: Adapting the Kano Model to the Design of mHealth Applications

Framework:	UCD	**Author:**	Dueholm Müller, S et al.	**Year:**	2022
Topic:	eHealth / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

Background

Health care services are increasingly being digitized, but extant literature shows that digital technologies and applications are often developed without careful consideration of user needs. Research is needed to identify and investigate best-in-class methods to support user-centered design of mHealth applications.

Objectives

The article investigates how the Kano model can be adapted and used for the purpose of eliciting child patients' information needs during the design phase of mHealth application development. The aim is to demonstrate its applicability for collecting and analyzing patient-centered data that are key to designing technology-supported solutions for health management.

Methods

The article is based on a mixed-methods case study, which includes interviews with 21 patients aged 6 to 18. Structured interviews are analyzed based on prescriptions of the Kano model. Semi-structured interviews about child patients' information needs are analyzed thematically.

Results

The results demonstrate several improvements to the Kano model that take into account the difficulties of effectively communicating with child patients. The combination of two types of interviews offers unique insights into the what, how, and why of patients' needs. Adaptation of the Kano model, simplification of response options, and participation of child patients' parents in interviews facilitate data collection.

Conclusion

The article shows how the Kano model can be adapted to provide an effective means of eliciting child patients' needs. Adapting the model by combining structured and semi-structured interviews makes it a powerful tool in designing mHealth applications.

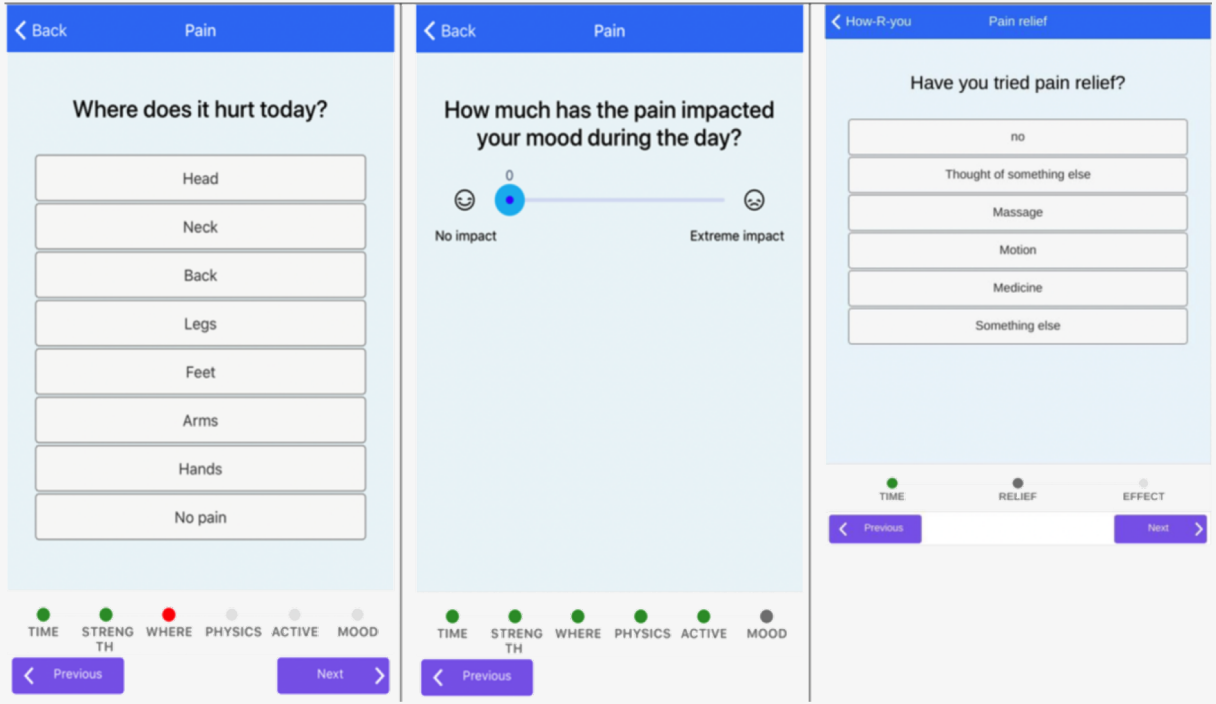
Provides

- An **overview of information needs** for young arthritis **patients** as well as
- **Simplified interview questions** /formats** regarding service creation for semi-/structured interviews with child patients (incl. 3-level questionnaire for responses); important to stay at children's eye-level
- Also an app-based approach as **alternative to interviews** or conventional quality questionnaires (here on PROs/ PROMSs: patient-related outcomes of treatments). This is achieved by means of the KANO-technique; Features in Table 7.
- Hints on analyzing the results (Tab. 6)

** the simplified KA'NO interview questions are reported as Tables 4+5 of the article.

#21: Eliciting Information Needs of Child Patients: Adapting the Kano Model to the Design of mHealth Applications

Framework:	UCD	**Author:**	Dueholm Müller, S et al.	**Year:**	2022
Topic:	eHealth / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link



The sample (health-related) **information needs** from above should be transferrable to eService creation and evaluation for other (at least **chronically ill) children**. Same is true for the **corresponding interview questions in structured and semi-structured way**.

#22: Survey-based personas for a target-group-specific consideration of elderly end users of information and communication systems in the German health-care sector

Framework:	UCD	**Author:**	Schäfer, K et al.	**Year:**	2019
Topic:	eHealth / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

Background

In many countries, including Germany, older people are increasing in numbers, while fewer caregivers are available. A way to address the problem is to develop new medical assistance and monitoring systems that are operated by the elderly on their own, e.g. in-home aftercare systems.

Objective

The development of a set of eight data-based personas in terms of a best practice approach is presented.

Method

"Personas" are an integral method of the user-centered design approach. They address the problem of incomplete knowledge of individual user behaviour by introducing archetypal user groups. Thus, personas can be used at an early stage of development to raise the awareness of developers to the needs, skills, and abilities of the elderly. Personas are also a cost-effective method and quickly and easily accessible. In order to guarantee representativeness the development of personas needs to occur based on a robust data set of a certain user group.

Results

This article presents the data-driven development of eight personas. The applied data set results from a nationwide questionnaire study on the elderly's use of information and communication technology, out of elderly people in Germany. The results will be presented in terms of best practice.

Conclusion

To conclude, survey-based personas of older end users can play an important role in the research and development of innovative devices.

Application

The personas presented in this paper can be used in research and development to raise awareness of the needs and demands of end users.

Provides

- 8 **detailed survey-based (n = 551) personas for elderly** German persons from a healthcare service perspective (word document in Appendix!, example below)
- Underlying **Characteristics to survey for personas**. (Table 1):

#22: Survey-based personas for a target-group-specific consideration of elderly end users of information and communication systems in the German health-care sector

Framework:	UCD	**Author:**	Schäfer, K et al.	**Year:**	2019
Topic:	eHealth / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

Part	Factors/Information
Personal Background	Gender
	Age
	Place and Type of Residence
	Educational Achievement
	Professional Career
Health Situation	Illnesses
	Health Literacy
	Use of Health Applications
Need for Information on Medical Issues	Health Literacy
	Information Needs
	Satisfaction with Information Sources
Attitudes toward Technical Equipment	Technical Affinity
	Technical Experience and Preferences
	Ownership and Reason for Purchase
	Internet Usage
	Installing Programs
	Integration of Technology into Everyday Life
Further Information	Quotes
	Image Sources
	External Data Sources
	Fictional Elements

The many sample (health-related: amongst others 2 persons with arthritis) **personas** from above should be transferrable to (larger) eService creation contexts and evaluation for other elderly (at least from Germany); **partly usable details beyond healthcare context!**

Also, in case discarding their 8 sample ones , it details **characteristics to survey when pursuing personas.**

#23: Design Thinking for Sustainability 2

Framework:	Design Thinking & Sustainability	**Author:**	Rosanna Garcia, PhD, Scott Dacko, PhD	**Year:**	2015
Topic:	Research project	**Researcher:**	Ursula Tischner	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

This chapter focuses on how a sustainability approach can be merged with design thinking to develop socially responsible and environmentally sustainable products. It merges with design for sustainability insights to provide a means whereby consumers become inseparable partners in ensuring the longevity of our natural, social, and economic environments. A sustainable perspective to design thinking approach is necessary if environmental and related social and economic issues are to be targeted and addressed effectively.

As a means to evaluate more critically the various design for “X” strategies, design for sustainability (DfS) (also referred to as design for efficiency), design for effectiveness (DfEffv) and design for environment (DfEnv) are presented as the three overarching approaches that encompass most of the more specific design strategies. The design thinking for sustainability (DTfS) approach draws on the strengths of the three, and proactively includes the consumer as a co-development partner.

The design thinking for sustainability (DTfS) approach draws on the strengths of the three, and proactively includes the consumer as a co-development partner.

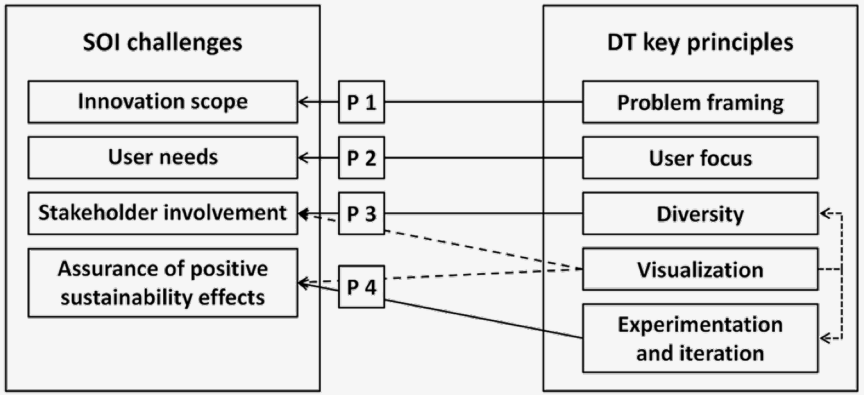
#24: Design Thinking for Sustainability: Why and how design thinking can foster sustainability-oriented innovation development

Framework:	Design Thinking & Sustainability	**Author:**	Buhl A, Schmidt-Keilich N, Muster V, Blazejewski S, Schrader U, Harrach C et al.	**Year:**	2019
Topic:	Research project	**Researcher:**	Ursula Tischner	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

Sustainability-oriented innovations (SOI) are indispensable to enable sustainable consumption and production. However, their multidimensional character makes the development of SOI an often difficult task for companies. This article addresses four major challenges which are in particular associated with SOI development, including defining an adequate innovation scope, considering various stakeholders and identifying related user needs and sustainability effects. This clearly shows that there is a continuous need for adequate methods and tools that enable companies to successfully develop SOI. Design thinking (DT), a user-centered and iterative problem-solving approach, has recently attracted research interest as a possible approach to tackle complex socio-ecological problems. However, a systematic and detailed discussion of the application of DT for SOI development is still missing. This article explores why and how design thinking can foster the development of SOI. For this purpose, the concept of DT with its five key principles (i.e., problem framing, user focus, diversity, visualization, experimentation and iteration) is presented. In a next step, we develop a research framework with four propositions that demonstrate the suitability of DT's key principles for meeting the identified SOI challenges. Finally, boundary conditions, practical implications and opportunities for further research are pointed out.

- Defining an adequate innovation scope,
- Considering various stakeholders
- Identifying related user needs and
- Sustainability effects.

How to overcome the challenges of sustainability innovation by applying design thinking methodologies:



#25: Sustainable Design Thinking Website

Framework:	Design Thinking	**Author:**	Kilian Karg, Ackerstr. 20, D-10115 Berlin	**Year:**	
Topic:	Design Agency	**Researcher:**	Ursula Tischner	**Language:**	German
Inclusivity:	Yes	**Type of the source:**	Website & Process	**Link:**	Link

What is Sustainable Design Thinking?

USER CENTERED SUSTAINABLITY

Design Thinking is an agile way of working and thinking, which creates user-centered, innovative solutions in multidisciplinary teams.

Sustainable Design Thinking stands for a timely approach that helps to take on the big challenges of our future.

This is done through the targeted application of different methods and through positive, open and holistic thinking.

Sustainability is seen as an additional driving factor for innovation.

Team Culture:

Through consciously reflective teamwork, work rule, team thinking and team appropriate work environment, productive collaboration in teams is maximized. Functioning interdisciplinary and multicultural teams provide the opportunity to work on even very complex problems.

Work Environment:

The space and work materials reflect the flexible, structured and creative way of working. To this end, the place of creation is deliberately optimized for teamwork.

Sustainability:

Sustainable Design Thinking considers the sustainability factor in all phases of the process, in the composition of the teams and their working methods as well as in the optimization of the working environment. In addition, the development of sustainable solutions is promoted through the selection of suitable methods and a view of the "big picture".

Agility and iteration:

Among other things, great progress is achieved within a very short period of time through openness to results and tight timing. This offers the possibility to flexibly respond to new findings within a project and to discard or revise results at an early stage.

Creativity:

Creative methods and team culture foster the creative potential of a team and its members. Expertise and "out of the box" thinking are utilized.

Process:

Work is done in a structured manner. The process is divided in the first half into the phases of understanding, observing and synthesizing. In the second half, ideas are developed, turned into simple prototypes and tested.

#25: Sustainable Design Thinking Website

Framework:	Design Thinking	**Author:**	Kilian Karg, Ackerstr. 20, D-10115 Berlin	**Year:**	
Topic:	Design Agency	**Researcher:**	Ursula Tischner	**Language:**	German
Inclusivity:	Yes	**Type of the source:**	Website & Process	**Link:**	Link

The **design thinking process is agile and iterative**. Its application requires great flexibility depending on the project.

Processes offer security and help to work in a focused and efficient manner. It is important to always be aware of where the Sustainable Design Thinking team is in the process.

For Sustainable Design Thinking, we suggest the following **process framework:**

- Synchronize teams
- Build user understanding
- Synthesize
- Develop ideas
- Create prototypes
- Test and get expert feedback
- Implement

The first as well as the last step are essential for a successful overall project.

By dividing the process into two parts - the problem-focused and the solution-focused part - it is also ensured that great ideas are not generated too quickly, but do not address the actual relevant problems or deeper-lying needs.

Anchoring sustainability in the Design Thinking process is possible through regular reflection of the current work status. In order to maintain a positive mindset while working, it is advisable to institutionalize these sustainability checks in the process.

For example, very non-sustainable ideas can also arise within the idea phase, which, however, mean user-centered sustainable development through appropriate adaptation. The light-heartedness in the creative process ("Yes And!", "Defer Judgement!") in combination with a critical reflection during and after the selection of the ideas thus leads to a sustainable innovation idea.

#26: Design Thinking Publications from IDEO

Framework:	Design Thinking	**Author:**	IDEO, Tim Brown et al.	**Year:**	
Topic:	Design Agency	**Researcher:**	Ursula Tischner	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Several Papers, Website etc.	**Link:**	1 2

"Design thinking is a human-centered approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success."

—TIM BROWN, EXECUTIVE CHAIR OF IDEO

Article: Design thinking for social innovation

Tim Brown and IDEO.org CEO Jocelyn Wyatt highlight the way design thinking can serve clients and companies in the nonprofit sector

Designers have traditionally focused on enhancing the look and functionality of products. Recently, they have begun using design tools to tackle more complex problems. In the Stanford Social Innovation Review, Tim Brown and Jocelyn Wyatt describe that while businesses were first to embrace this new approach—called design thinking—nonprofits are beginning to adopt it too.

Article: Design Thinking for the Greater Good

Through ten stories of struggles and successes in fields such as health care, education, agriculture, transportation, social services, and security, the authors of this paper show how design thinking and collaborative creativity can shake up even the most entrenched bureaucracies—and provide a practical roadmap for readers to implement these tools

Jeanne Liedtka, Randy Salzman, and Daisy Azer explore how major agencies like the Department of Health and Human Services and the Transportation and Security Administration in the United States, as well as organizations in Canada, Australia, and the United Kingdom, have instituted principles of design thinking.

IDEO.org IDEO.org is a nonprofit design studio. Designing for Access:

Designing for

- access
- resilience
- choice
- wellbeing
- prosperity
- safety
- health
- equity
- transformation

We design products and services alongside organizations that are committed to creating a more just and inclusive world.

#26: Design Thinking Publications from IDEO

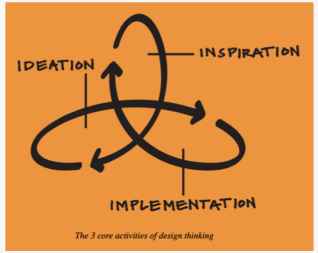
Framework:	Design Thinking	**Author:**	IDEO, Tim Brown et al.	**Year:**	
Topic:	Design Agency	**Researcher:**	Ursula Tischner	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Several Papers, Website etc.	**Link:**	1 2

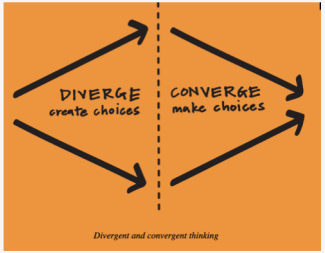
Course: The d.school Starter Kit (link 2)

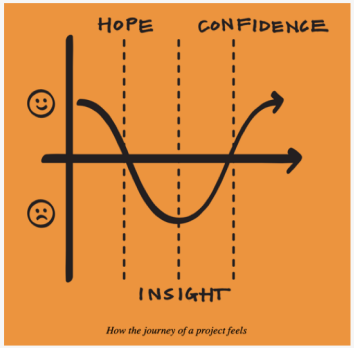
Looking for a way to introduce design thinking to students in the classroom or colleagues at work? The Stanford d.school's online Starter Kit is free and available over Zoom.

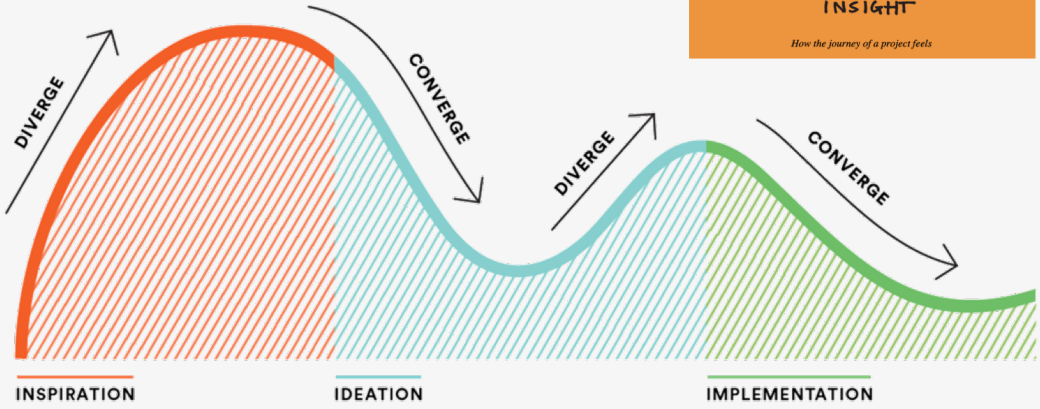
The Stanford d.school's three hour online intro to design thinking is specifically made for people who want to introduce design to students in classes or colleagues in the workplace. The curriculum is free to use and tailored for distributed learning (facilitators do need a Zoom Pro, Business, or Enterprise plan for breakout rooms and unlimited time). Participants only need a laptop with WiFi and Zoom, a pen, and a few sheets of paper. The workshop addresses a medley of design abilities, methods, and mindsets. A series of quick videos featuring designers at work gets participants up to speed while one-on-one activities give them a taste of how to practice human-centered design. The experience is guided every step of the way with step-by-step video instructions from d.school educators Laura McBain & Louie Montoya.

The original Design Thinking Methodology was co-developed by IDEO and others









#27: How to do Ecodesign

Framework:	Sustainable, ethical and participatory design	**Author:**	Ursula Tischner et. al.	**Year:**	2016 (orig. In 2000)
Topic:	Green Design & Sustainability	**Researcher:**	Ursula Tischner	**Language:**	English / German
Inclusivity:	Yes	**Type of the source:**	Book	**Link:**	Link

With the new edition of this publication, we would like to respond to questions about ecological product design and life cycle thinking. It is directed towards everyone interested in contemporary design that has an eye on both design and environmental protection. This book fits well in our efforts to develop supportive and competence-building practical information that can serve as a guide and offer help to designers and other practitioners of environment-friendly and sustainable product design.

This handbook describes

- Why Design for Sustainability (DfS) and Ecodesign are important and which framework conditions exist
- Important Ecodesign and DfS strategies
- How Ecodesign and DfS are carried out in practice
- How Ecodesign and DfS can be initiated and implemented in companies
- And especially which processes, methods and tools are helpful to do so.

Many methods and tools are mentioned in the book, especially in the toolbox. It includes participatory, social and inclusive design methods.

#28: Design for the Real World

Framework:	Sustainable, ethical and participatory design	**Author:**	Victor Papanek	**Year:**	2005 (orig. In 1972)
Topic:	Green Design & Sustainability	**Researcher:**	Ursula Tischner	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Book	**Link:**	Link

One of the world's most widely read books on design. In this revised edition, Victor Papanek examines the attempts by designers to combat the tawdry, the unsafe, the frivolous, the useless product, once again providing a blueprint for sensible, responsible design in this world, which is deficient in resources and energy.

A big part of his approach is designing WITH people not FOR people. So he promotes participatory design including the users actively in the process.

In order to work more intelligently, the whole practice of design has to be turned around. Designers can no longer be the employees of corporations, but rather must work directly for the client group - that is, the people who are in need of a product. At present the role of the designer as an advocate does not exist.

In the United States, design is not overtly used in a political manner: rather, it unblushingly serves purely profit-oriented clients. But the implicit message of most of this design is one that caters almost exclusively to the wants of the upper middle class.

Consumer testing is frequently done in one of two ways: either secretaries are urged to sit in the chairs for however long it takes them to type one sentence (after which their attention is directed towards the delicious upholstery colour and texture), or else the chair is sat upon for hundreds of hours by a machine to see if one of the chair legs will break off. Neither test, I would submit, really gets down to the fundamentals: do different secretaries experience major discomfort while working hard, seated in a chair for a series of four-hour periods, stretching over weeks, months, or years ? More crucial still is the fact that almost nothing industry designs and markets is ever re-tested.

When we work as a cross-disciplinary team to design a better chair for secretaries, who are we designing for? Certainly the manufacturer wants to build secretarial chairs only to sell them and make money. The secretary herself must be part of our team. And when the chair is finished (interior designers, decorators, office planners and architects please note!) there must be real testing. Nowadays an 'average' secretary. And when the chair is finished (interior designers, decorators, office planners and architects please note!) there must be real testing. Nowadays an 'average' secretary is usually asked to sit in the new chair, sometimes even for five minutes, and then asked, 'Well, what do you think ?' When she replies, 'Gee, the red upholstery is real different!' we take this for assent and go into mass production. But typing involves eight hours a day, long stretches of work. And even if we test secretaries intelligently on these chairs, how can we see to it that it is the secretaries themselves who make the decision as to which chair is bought ? Usually that decision is made by the boss, the architect, or (God save us) the interior decorator.

Our (Desinger's) role is changing to that of a 'facilitator' who can bring the needs of the tool (Design) in the hands of the people.

Use especially the participatory inclusive design approach in our methodology: involving potential future users actively in the design process.

#29: The Green Imperative

Framework:	Sustainable, ethical and participatory design	**Author:**	Victor Papanek	**Year:**	2022 (orig. In 1995)
Topic:	Green Design & Sustainability	**Researcher:**	Ursula Tischner	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Book	**Link:**	Link

A fresh edition of the sustainable design pioneer Victor Papanek's classic and ever-relevant book examining the important role of design in combating climate change.

Whether it's horror at the plastic littering the world's beaches or despair at the melting polar ice caps, the world is gradually waking up to the impending climate disaster. In The Green Imperative, Papanek argues for design that addresses these issues head-on. This means using materials that can be recycled and reused, no more pointless packaging, thinking about how products make us feel and engage all our senses, putting nature at the heart of design, working at a smaller scale, rejecting aesthetics for their own sake, and thinking before we buy.

First published at the end of the twentieth century, this book offered a plethora of honest advice, clear examples, and withering critiques, laying out the flaws of and opportunities for the design world at that time. A quarter of a century on, Papanek's lucid prose has lost none of its verve, and the problems he highlights have only become more urgent, giving today's reader both a fascinating historical perspective on the issues at hand and a blueprint for how they might be solved.

Designers need:

1. The ability to research, organize and innovate.
2. The capacity to develop appropriate answers to new or newly emerging problems.
3. The skill to test these answers through experimentation, computer modelling, working prototypes or real-world test runs.
4. The training to communicate such developments through drawings, models, mock-ups and feasibility studies, video or film, as well as through verbal, computer-generated or written reports.
5. The talent to combine form-giving with rigorous technical considerations and with a sense of humane and social factors and aesthetic enchantment.
6. The wisdom to anticipate the environmental, ecological, economic, and political consequences of design intervention.
7. The ability to work with people from many different cultures and different disciplines. (8)

Design should also be Spiritual:

1. "I firmly believe that it is the intent of the designer as well as the intended use of the designed object that can yield spiritual value. The European word 'form giving' may express best what industrial designers do always being careful to include the workings of the device in the form-giving and making sure that a degree of inventiveness is part of the design process. As we practise our art and skill, what we do moulds who we are and what we are becoming."
2. When we become the hired guns of greed-driven corporations, we are driven to **conform**.
3. If we generate status kitsch for a jaded élite, and allow ourselves to become media celebrities, we **perform**.
4. When we twist products to reflect the navel-gazing of market research, we **deform**.
5. If our products divorce appearance and the other functions – a telephone that looks like a duck and quacks instead of ringing, a clock-radio that looks like a female leg – we **misinform**.
6. When our designs are succinct statements of purpose, easy to understand, use, maintain and repair, long-lasting, recyclable and benign to the environment, we **inform**.

#29: The Green Imperative

Framework:	Sustainable, ethical and participatory design	**Author:**	Victor Papanek	**Year:**	2022 (orig. In 1995)
Topic:	Green Design & Sustainability	**Researcher:**	Ursula Tischner	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Book	**Link:**	Link

7. If we design with harmony and balance in mind, working for the good of the weaker members of our society, we **reform**.
8. Being willing to face the consequences of our design interventions, and accepting our social and moral responsibilities, we give **form**.
9. All this can be done only if we learn to recognize the ethical dilemmas of our profession.

Questions to be asked by Designers:

- Will the design significantly aid the sustainability of the environment?
- Can it make life easier for some group that has been marginalized by society?
- Will it save energy or better still help to gain renewable energies?
- Can it ease pain?
- Will it help those who are poor, disenfranchised or suffering?
- Can it save irreplaceable resources?

People Participation

- The job of the designer is to provide choices for people. These choices should be real and meaningful, allowing people to participate more fully in their own life decisions, and enabling them to communicate with designers and architects in finding solutions to their own problems. (59-60)

#30: Design Workshops in der Lehre: Erleben und Kompetenz

Framework:	design thinking, HCD	**Author:**	Mucha, Henrik; Jacobi, Ricarda	**Year:**	2021
Topic:	(ICT / Industrial) Design	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	German
Inclusivity:	No	**Type of the source:**	Article	**Link:**	Link

Design aims to give concrete form to an abstract idea in order to find an appropriate solution to a given design problem. This is done by selecting and processing material, which can be tangible or intangible, analog or virtual. To do this systematically is the task of the designer. To this end, budding designers are taught skills in design training that culminate in the acquisition of design competence. It should be noted here that design education, especially at the university level, differs in some respects from education in other fields of study. Most important in this context is the strong focus on project work in small groups. This is accompanied by a more direct exchange between students and teachers, which is characterized by a high degree of practical relevance. This concept was described in particular by Lucius Burckhardt and is known as the Kassel School. In addition, design-based teaching relies heavily on independent learning through action.

In this contribution, we describe how we integrated Design Thinking in our teaching by means of Design Workshops and what effects were observed.

Defines and advocates design thinking (Brown 2009:7, „set of principles that can be applied by diverse people to a wide range of problems) and also HCD (ISO 9241-210). They also underscore that everybody can design without being a professional designer.

Details workshop formats **(here: 'sprints') and recommends participation of stakeholders**.

Applies design workshops in **higher education (technical courses of studies)**, cp. Section 4.2. Also lists competenceies addressed by design workshops for higher education (Table 4).

Table 2: Provides week agenda for practically proven typical design sprint:

Montag	*Map* // Das Problem verstehen und visualisieren *user journey map, interviews, how might we, affinity diagram*
Dienstag	*Sketch* // Ideen generieren *lightning demos, four-step-sketch*
Mittwoch	*Decide* // Entscheiden, welche Idee ausgebaut wird *decision making techniques, storyboarding*
Donnerstag	*Prototype* // mit einfachen Tools wie PowerPoint oder Keynote *rapid prototyping*
Freitag	*Test* // Testen mit Nutzern *usability testing*

#30: Design Workshops in der Lehre: Erleben und Kompetenz

Framework:	design thinking, HCD	**Author:**	Mucha, Henrik; Jacobi, Ricarda	**Year:**	2021
Topic:	(ICT / Industrial) Design	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	German
Inclusivity:	No	**Type of the source:**	Article	**Link:**	Link

Table 3: Lists mechanisms of design sprints

Wann wirken Design Sprints?	
When stakes are high. When there is not enough time.	Sprints können helfen, mit überschaubarem Ressourcenaufwand die Zielrichtung eines Projektes zu bestimmen. Damit helfen sie, zu entscheiden, welche Ideen verfolgt werden sollen.
When you are plain stuck.	Projekte können in der Startphase schwierig anlaufen oder unterwegs Momentum verlieren. Hier können Sprints neue Perspektiven eröffnen.
Wie wirken Design Sprints?	
Hard deadline...	bewirkt Fokussierung und ist notwendig, da Design ein „messy process" ist, der ohne erzwungenes Ende (Abgabetermin) theoretisch
	endlos weitergehen kann. Deswegen ist es wichtig, Kriterien dafür zu definieren, wann eine Lösung als fertig gilt (definition of done). Ein Design Workshop wie der Sprint verknappt die Zeit dermaßen, dass maximale Fokussierung essenziell wird und so Lösungen forciert werden.
Flare and focus.	Im Designprozess geht es darum, im Wechsel einen Raum der Möglichkeiten aufzuspannen, um dann im nächsten Schritt auf Grundlage von Spezifikationen und Evaluation (mit Nutzenden) auf eine Lösung zu fokussieren. Design Workshops bewirken, dass das Aufspannen und Eingrenzen so organisiert wird, dass es in minimal kurzer Zeit geschieht. Hierzu sind die Taktung und Einhaltung der Workshop-Planung entscheidend.
Work alone together.	Individuen erarbeiten mehr und bessere Ideen, wenn sie alleine arbeiten (Taylor et al., 1958). Allerdings entfalten diese Ideen erst in Resonanz mit anderen Gedanken und Meinungen ihre Wirkung. Dies gilt insbesondere für die Art komplexer Designprobleme, die wir betrachten (Software, Maschinen, Dienstleistungen). Diese Aufgaben sind immer Teamaufgaben. Sprints sehen explizit Zeit zum „working alone" vor, organisieren darüber hinaus aber ebenso explizit Zeit, um die erarbeiteten Ideen zu testen, d. h. in Resonanz mit anderen zu validieren oder zu falsifizieren.
Visualization is key.	Das Problem und die Lösung werden in Design Workshops immer durch Methoden der Visualisierung und des Prototypings in Form von Artefakten konkret gemacht. Das Team entwickelt so aktiv ein gemeinsames Verständnis.
Openness.	Der Prozess ist per Definition offen und sogar auf das Mitmachen von Akteurinnen und Akteuren mit möglichst heterogenen fachlichen Hintergründen und Fähigkeiten angewiesen, um ein breites Spektrum an möglichst kreativen Ideen und Lösungen zu entwickeln.

See esp. approach and tools (workshops) above that could generally be valid for human-centered design, at least for university teaching (Section 4 and Table 4).

#31: Leitfaden Ko-Kreation: Urbane Transformationen mit Urban Design Thinking

Framework:	Design Thinking, co-creation	**Author:**	Pahl-Weber E, Jeutner M, Flade K, Gabsch G	**Year:**	2022
Topic:	Urban Developmention	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	German
Inclusivity:	Yes	**Type of the source:**	Project proceedings	**Link:**	Link

“Urban co-creation“ is en vogue. But how can it be achieved in planning practice? It requires methods that take the complexity of cities and their development into account and that, at the same time, have a low threshold for everyone to participate. The Urban Design Thinking (UDT) method is capable to include the needs of users in the development of their city within the framework of co-creative urban development and thus enables the generation of ideas for complex urban challenges. It was developed in 2015 by the Chair of Urban Renewal and Sustainable Development at the Technical University of Berlin, based on Stanford University’s Design Thinking method. UDT has already been applied in a variety of study and research projects, including the research project „Migrants4Cities“, which TU Berlin carried out together with the City of Mannheim and inter3 – Insitut für Ressourcenmanagement. This guide provides a practical overview of the application of UDT based on the project experiences of „Migrants4Cities“. It places the method in the context of co-creation in urban development. The necessary framework for a successful UDT process as well as the potential challenges are presented. Insights into UDT practice are provided by an overview of the ideas developed in the project „Migrants4Cities“ as well as an interactive UDT quick run-through, which, invites readers to try it out for themselves.

Advocates Stanford University’s Design Thinking method as proven in a project where migrants targeted users (Migrants4Cities funded by German Ministry for Research and Education BMBF).

Gives exercises (Ch. 03) and How-To-sections. (Ch. 05—06) including amongst others, on testing ideas, p. 28 http://dx.doi.org/10.14279/depositonce-15006 or urban Labs (chapter 5). Pictures real-life personas (p. 30, p. 33, p. 36).

Also provides frameworks for HCD and co-creation process (cp. figure below; pp. 12—14).

See esp. approach and tools as shortly described above targeting migrant (user) group… that could generally be transferred in detail for practice-based (German) university teaching using their examples

Provides comprehensive Design Thinking Video in German http://dx.doi.org/10.14279/depositonce-15005 .

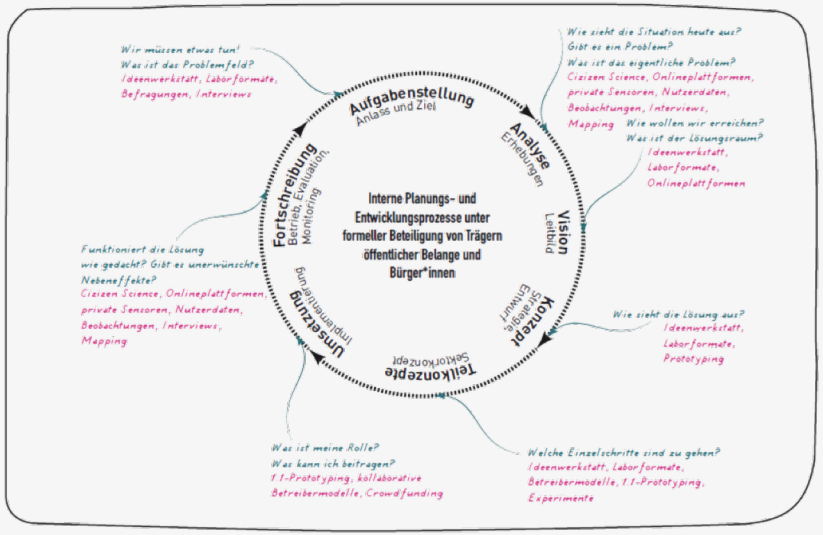


ABB. 3: INDUKTIVE ELEMENTE IN KO-KREATIVEN FORMATEN

#32: IT für soziale Inklusion

Framework:	HCD, UCD, participative design, Design Research	**Author:**	Burchardt, Aljoscha; Uszkoreit, Hans	**Year:**	2018
Topic:	Social inclusion	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	German
Inclusivity:	No	**Type of the source:**	Proceedings of VISION SUMMIT	**Link:**	Link

In this book, we would like to emphasize an aspect that is often neglected in the debate, namely the potential of increasingly smart IT for social inclusion.

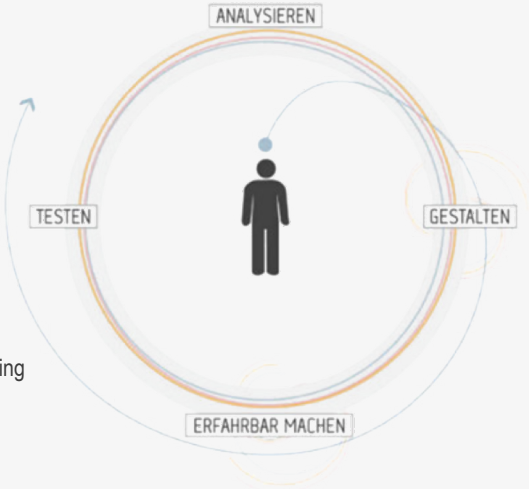
Large groups of the population, for example, cannot use the wealth of information on Wikipedia or the services of smart devices at all because they have motor or cognitive impairments and are thus unable to adequately operate PCs and smartphone apps. Others do not understand our language well enough or have even more fundamental limitations, for example, they cannot even move in traffic or in their homes without assistance and thus participate only very marginally in social life. Advances in AI and other fields of IT, however, not only open up new opportunities to let the previously excluded participate in the blessings of the information age, they also offer solutions of inclusion and participation in much older problem areas of disadvantage and exclusion.

Featuring (in the environment of inclusion):

- Assistive technologies, e.g. for depression patients, elderly, rehab patients
- Augmented Reality-glasses for read/write-impaired youth
- Integrated care for chronically ill persons
- Elderly home care robotics (Care-O-bot (p. 98)
- Networking for Multiple-Sclerosis-patients
- Speech recognition
- Gloves digitalizing the alphabet for deaf-blind people.
- Language translation for migrant Arabic persons
- AI-based rollator walker (detecting surroundings)
- Ambient and wearable smart technologies

Provides (out of various project/ product developments)

- Discussions of Design & Inclusion (e.g. pp. 21 —25;, 69—76)
- Shows example case study for participative design (pp. 81—82)
- Description and picture of HCD process (pp. 90—91, see below)
- Approaches for analyzing user context without interviews (observing and shadowing dementia patients!, pp. 100—102)
- Deduced design guidelines for ambient assisted care solutions supporting Univeral Design (pp. 104—106)
- Samples of science / university/ research initiatives including higher education teaching (pp. 157—165)



See esp. approaches and tools as shortly described above targeting elderly, handicapped or other (user) groups.

That could generally be transferred , in particular regarding university teaching using their examples.

#33: User-Centered Design Approaches and Methods for P5 eHealth

Framework:	UCD / participatory design; UX	**Author:**	Triberti, Stefano; Brivio, Eleonora	**Year:**	2020
Topic:	eHealth	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

As seen throughout the overarching project proceedings, eHealth informed by P5 ** approach gives full recognition to patients' contexts, needs, desires, and personal characteristics. These aspects should not only be considered as cornerstones for technology evaluation, but as fundamental guidelines for design in the first place. This relates to User-Centered Design, that is, any technology/service design where final users influence how the design itself takes place. In other words, eHealth development should be based on research data gathered among final users about their needs and contexts of use, in order to be specifically tailored on final users even before the realization of low-level prototypes. This methodological contribution presents a critical presentation, description, and evaluation of research tools to be employed not to evaluate technology's results and effectiveness, but the specific characteristics of users in order to orient design and development. Such an approach should be considered the "gold standard" of P5 eHealth solutions.

**** 5Ps in context of healthcare to support the management of incurable, chronic conditions:**

1. Prevention
2. Personalized
3. Predictive precision
4. Participatory
5. Psycho-cognitive

Lists some **methods for user-centered approach** proven in their project for incurable cancer patients beyond questionnaires like SUS:

For Usability inspection: **cognitive walkthrough** (which is based on exploring each function of the interface in sequence, reporting any possible problems encountered by a hypothetical user) **and heuristics analysis** (which is a global, holistic analysis of interface).

Cognitive walkthrough (Kushniruk et al. 2015) entails a checklist to be followed by evaluators who put themselves in the shoes of users, accounting for each possible action that the user would take with the interface and signaling any possible mistake or interaction issue.

Differently, **heuristic evaluation** is based on a list of general criteria interfaces should respect in order to guarantee effective usage. A number of heuristics lists are available, such as the generic (and probably most used) by Nielsen (1995) and others for specific technologies or domains (Hermawati and Lawson 2016).

Another option (that could be also used in conjunction with inspection methods) is **usability testing**, which constitutes any technique for evaluation that involves final users who interact with the interface in systematic and more or less controlled contexts, in order to identify usability issues by a critical evaluation of actual interaction; usability testing could employ a number of methods and tools for registering usability issues, ranging from physiological signals to interviewing the participants to observation of behavior (e.g., counting the number of errors) (Smilowitz et al. 1994).

With regard to the evaluation of interaction factors, the **main suggestion** coming from the P5 approach is not to "resolve" such issues by basic evaluations such as using a usability questionnaire alone; on the contrary, **evaluators should be activated in any phase of the development process**. Specifically, usability inspection and testing methods can be applied at different phases of conceptualization of the interface and prototyping, in order to modify interaction issue in itinere.

#33: User-Centered Design Approaches and Methods for P5 eHealth

Framework:	UCD / participatory design; UX	**Author:**	Triberti, Stefano; Brivio, Eleonora	**Year:**	2020
Topic:	eHealth	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

If technologies are designed to be used effectively, they should be able to communicate their scope as useful in terms of patients' personal objectives. The **user's purpose (context: e.g. cultural, organizational, and group/ social/ relational settings with caregivers or else) guides the artifact's design** and later its use.

For designing technologies with prevention features, **developers should be informed** not only about healthy behaviors to be promoted in the users, but also **of users' characteristics (instead of basing on prototypical representations), own habits, preferences, and typical behaviors**.

The approach has been targeting chronically ill persons and been applied during EU project for design of eServices.

They **introduce some typical UCD tools/techniques** that could be adapted to serve eHealth design and development in general: taking into account the importance of other aspects (i.e., attention to literature, consideration of disease/illness-related issues, user engagement, iterative prototyping), the application of such techniques could help developers to tailor technologies on their users, in order to assure not only positive functioning, but also the implementation.

See toolkit above that should be transferrable to use for development of other services, not only for healthcare context, but to other disadvantaged groups at least in urban environments.

#34: Human-Centered Systems Engineering

Framework:	HCD	**Author:**	Samaras, G.	**Year:**	2012
Topic:	eHealth / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:		**Type of the source:**	Medical Information Science Reference	**Link:**	Link

Deploying new tools and technologies often results in creating new problems while solving existing problems. A root cause is the interaction between tool design and organizational deployment. One undesirable result is the creation of stakeholder dissonance (SD). SD is a term for the conflict between the needs, wants, and desires (NWDs) of different stakeholders. In healthcare delivery systems, it is evidenced by errors, workarounds, and threats to patient safety and organizational profitability.

Human-Centered Systems Engineering (HCSE) is the foundational paradigm for managing SD. HCSE emphasizes the criticality of the interfaces between humans, their tools, and their organizations, offering methods to recognize, measure, and control SD. It is complimentary to Lean, Six Sigma, Balanced Scorecard, and Quality Function Deployment approaches.

Managing SD requires recognition of all stakeholders and their NWDs, permitting discovery and mapping of potential conflicts. Prioritizing conflicts for mitigation relies on standard risk analysis and decision analysis methods. HCSE provides methods for measuring only those NWDs involved, once the critical conflicts are chosen. This permits the mitigations to be verified, and the deployment design to be validated in a pilot setting, prior to general release of the new tools and technologies into the organization.

Provides relatively comprehensive **overview of human-centered systems engineering (HCSE): Corresponding factors (fig. 6)** and **how to address them (Tables 1+2) s well as general HCSE approach based on user's NWD: needs, wants and desires (fig. 3 as below)**. Also, how to convert 'customer voice' from requirements via specifications to deployment using quality management-proven toolkits like Ishikawa's, Quality Function Deployment (QFD; fig. 7-8: **SWOT, correlation matrix** / relationship matrix) or a KANO-based **stakeholder response matrix** (fig. 9). Furthermore, it **links to ISO/ IEC DTR 9126-4 from 2001 (SEES: "Safe, Effective, Efficient, and Satisfying in a Specified Context of Use")**.

The approach has been targeting **healthcare setting / a (children's) hospital** (also staff not only patients) and been applied across various projects for design of different technologies like computerized physican order entry.

See toolkit(s) above that should be transferrable to use for **patient-safe development of other services/ systems (including hardware)**, not only for healthcare context, but to settings with (disadvantaged and other) user groups at least in healthcare (esp. for certain patient populations).

#35: Patient Empowerment: The Role of Technology

Framework:	Design thinking, patient empowerment	**Author:**	Daruwalla Z et al.	**Year:**	2019
Topic:	eHealth / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

Patient empowerment is a buzzword that has gained much currency in recent years. It is defined as a process that helps people gain control over their own lives and increases their capacity to act on issues that they themselves define as important. This paper outlines the problems faced by the current medical model of patient empowerment and proposes a unique framework for patient empowerment that provides guidance on how health technology supports or detracts from empowering patients and families. The paper provides an ethical lens for physicians, policymakers, patients, and families in the health care system to consider the central role of the principles of autonomy and justice in patient empowerment. This paper also discusses how technology can be used to further patient empowerment and patient-centeredness of health care systems.

Shapes 3 empowering principles regarding (ethical) user rights as answers to 5 systemic (healthcare) problems as **distilled by a design thinking** method **: The **problems** are amongst others

- **Little** or no voice to **influence** the system for their own needs
- **Limited** access to or **control** over their own … information
- Even if access and control of their data, they are still at a knowledge and **information disadvantage** when interacting or negotiating with… providers.
- [where applicable: Users do often] **not receive any of the benefits**, including monetization of data, **from the use of their data**. In a world where data is increasingly an appreciating asset, this does not seem fair nor equitable

The 3 resulting **user empowerment principles** postulated are:

- **Access and control**: refers to the possession of one's own data [cp. EU-GDPR where e regionally applicable] and links the OCAP® Framework (ownership, control, access, and possession) https://fnigc.ca/ocap-training/ including **transparency** on who has access to their information and how and for what purpose it is being used.
- **Empowerment** should give people the knowledge, education and information to use that data in their own best interest (**tools to support [information/ data] literacy, navigation** of the … system)
- **Shareholding**: … all organizations that profit from a [user's] data pay out a '**dividend**' to the [user]. This is already seen in the retail industry, where companies **reward** customers for their data through **loyalty programs**.

** references British Design Council's Double Diamond method (cp. free documents https://www.designcouncil.org.uk/our-work/news-opinion/double-diamond-universally-accepted-depiction-design-process/ respectively forthwritten https://www.designcouncil.org.uk/our-work/skills-learning/tools-frameworks/framework-for-innovation-design-councils-evolved-double-diamond/ or https://www.designcouncil.org.uk/our-work/skills-learning/tools-frameworks/beyond-net-zero-a-systemic-design-approach/)

See esp. first 3 problems and (in EU last two) principles above that — even though from an information/systems perspective coming from extreme domain like healthcare/ patient empowerment] — could be partly transferrable to other (systematically disadvantaged) user groups, e.g. where it comes to information asymmetries or required information literacy (whilst maybe facing illiterate or child users) in human-centered initiatives.

#36: Patient-centered Coordination in Healthcare Service Networks

Framework:	Service design / engineering, Patient-centricity	**Author:**	Görlitz, RA.	**Year:**	2013
Topic:	eHealth / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

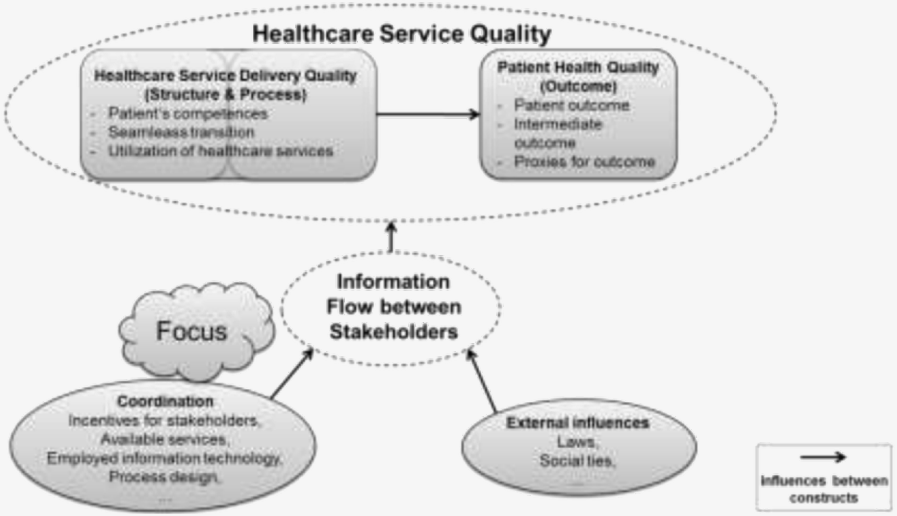
The healthcare domain has a strong organizational differentiation and suffers from high information asymmetries between the stakeholders, which reduces the healthcare service quality. ICT have promising potentials to support the involved stakeholders and facilitate the information flow thus granting effective and efficient interorganizational healthcare service coordination. However, comprehensive IT-systems or industry-wide standards are hard to develop because of entrenched work practices, diverging working requirements. and complex legal barriers.

This thesis takes a different approach and investigates the idea of inter-organizational coordination through a central service that facilitates the information flow between involved stakeholders. The conceived service is of socio-technical nature and provides incentives for all the involved stakeholders to share information, thus serving as a hub/ agent in the healthcare service network that distributes the information. The knowledge-intensive service consists of a regionally reacting person supported through Workflow Management System, cloud-based healthcare.IT, and telemedicine devices.

Expresses **characteristics of service quality** (for chronic patients/ healthcare, see figure below) during a service design/ engineering approach referring to Ramaswamy and himself **:

- **Self-Management competences**
- **Seamless transition between different service providers**
- **Utilization of services according to current guidelines**
- **Final and intermediate User Outcomes; proxies proven to relate to a final user outcome**

Besides internal influences, there are especially **laws**, social ties concerning information flows.



*** Ramaswamy R (1996) Design and management of service processes: keeping customers for life. Addison Wesley; also links own publication Görlitz RA et al. (2012)*

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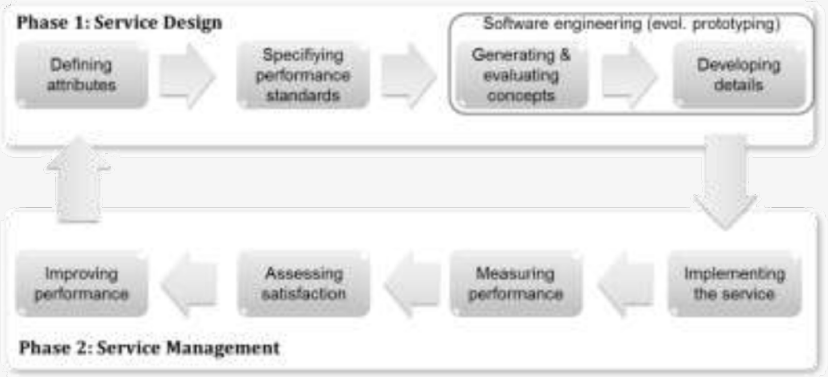
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

Evaluation takes place in form of a (healthcare-classic) randomized clinical trial (RCT) including a study group and a control group based on phone-based interviews and paper-based questionnaires, e.g. EQ-5D cp. https://euroqol.org/ or doi:10.1007/978-3-030-47622-9.

See esp. characteristics from above that **could** generally **be valid as principles for quality user-centric service design**, at least for other chronic patients, perpetual/ frequent users:

- Self-Management competences could be realized via means of user empowerment like **documentation or training offerings** for strengthening information literacy
- Seamless transition between different service providers: which should mean **considering industry-wide both (open) interfaces and (data) exchange standards**
- Utilization of services according to current guidelines: of course, l**egal constraints** apply here, but also **standards of ISO/ IEC** etc. or (at least industry) **best-practices** should be considered etc.
- … User Outcomes; proxies proven to relate to a final user outcome: **user outcome metrics/ measures to be defined in advance and applied!**

Fig 3: Integrates also software engineering into service design / management phases



#37: Reaching into patients' homes – participatory designed AAL services. The case of a patient-centered nutrition tracking service.

Framework:	Service design / engineering, Patient-centricity	**Author:**	Menschner P, Prinz A, Koene P, Köbler F, Altmann M, Krcmar H, Leimeister JM	**Year:**	2011
Topic:	AAL / ICT	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

Ambient Assisted Living (AAL) offers possibilities for promising new IT-based health care services that are resulting in new challenges for its design process. We introduce a novel approach for engineering AAL services (AALSDA) which combines methods from service engineering and participatory design. We demonstrate this approach by developing and implementing an electronic data capture system, NuTrack, for self-reporting of nutrition status. The approach uses different concepts for AAL service design and delivery: service engineering for standardizing and structuring service processes, reasonable IT-support for automation of parts of services that need no person–to-person interaction, participatory design to integrate end-users in the development process, and patient integration for personalizing and improving the depth of performance of service providers' service delivery. For illustration, we present the case of chronic disease patients suffering from impaired fine motor skills. Our approach is applied in a pilot study with prototypes tested in focus groups and workshops with patients, caregivers and physicians. The results demonstrate good applicability and feasibility of the concept, and provide new insights for the future design, development and implementation of AAL services.

Points out that as a matter of service engineering **IT enables** automation, **support of processes, standardization, and** new concepts for customer **integration**.

Participatory design requires inclusion of the user **in the entire development process** since it is important to determine user needs at a very early stage of development thus **fostering quality of requirements** (degree of innovation; higher user value **while cost-saving**), technology **acceptance and effectiveness; prototyping is valuable** for correspondingly developing computing services/ systems (confirms that **involving all stakeholders early on** in the service design process via participatory design **is a necessity**).

For Service Design, the integration of **users** (here elderly patients suffering from motor neuron disease) even more important because they are **always** (external) **factor of service** delivery impacting **quality and productivity**.

Uses **Service Engineering incl. Blueprinting** and then **integrates Prototyping (Prototypes from System Engineering) during evaluation of participatory Service Design solution** (Fig. on the next page; also available in German: Menschner et al. (2011) in Technologiegestützte Dienstleistungsinnovation in der Gesundheitswirtschaft. Gabler, doi:10.1007/978-3-8349-3506-9_5).

Evaluation takes place in form of **focus groups, workshops and field test.**

Concerns regarding data security, privacy and trust in service provider and service quality **need to be addressed** as well (best-possibly by clinical studies).

See esp. approach and tools (Blueprintin; Prototyping; focus groups, workshops and field test) above that **could** generally **be valid for user-centric service system design**, at least for other chronic patients in healthcare or for general system design ouf of software and hardware.

#37: Reaching into patients' homes – participatory designed AAL services. The case of a patient-centered nutrition tracking service.

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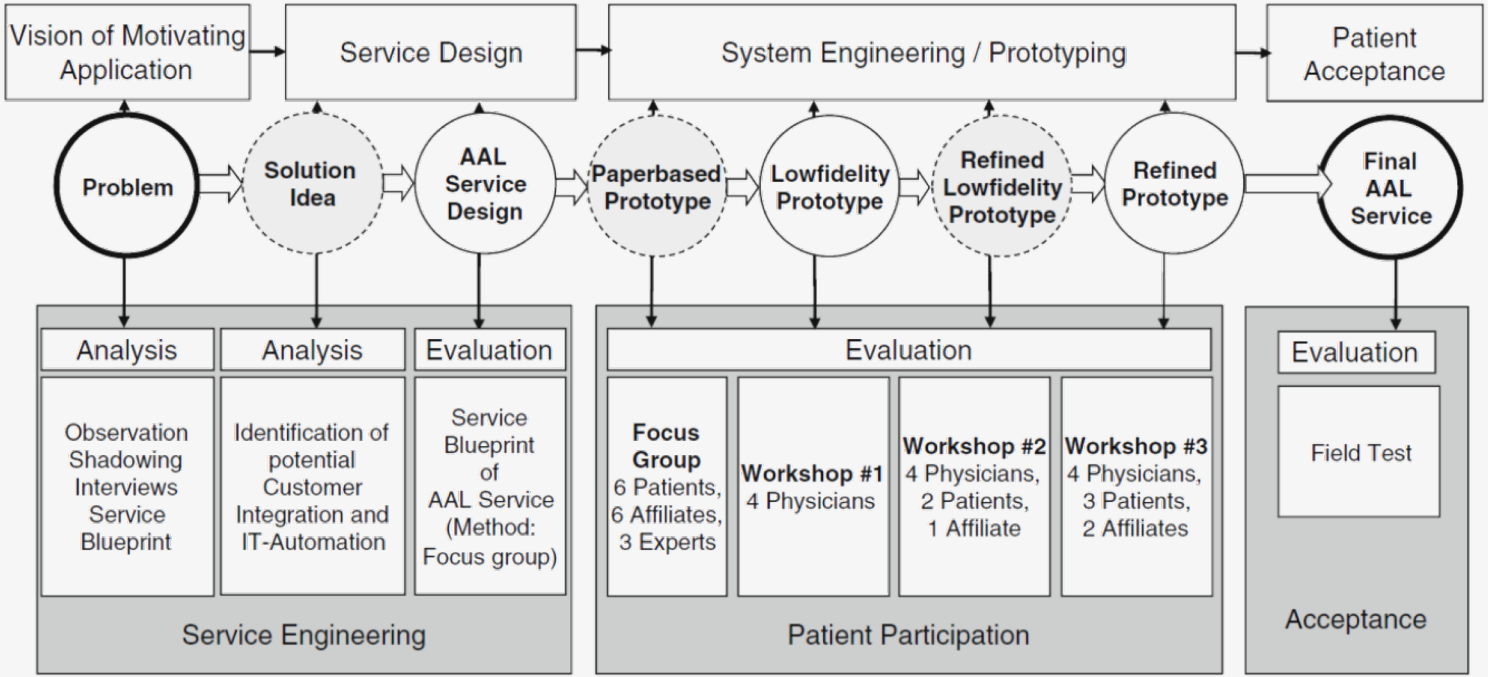


#38: Revealing clinicians' experiences towards healthcare software usability using human-centred design approach

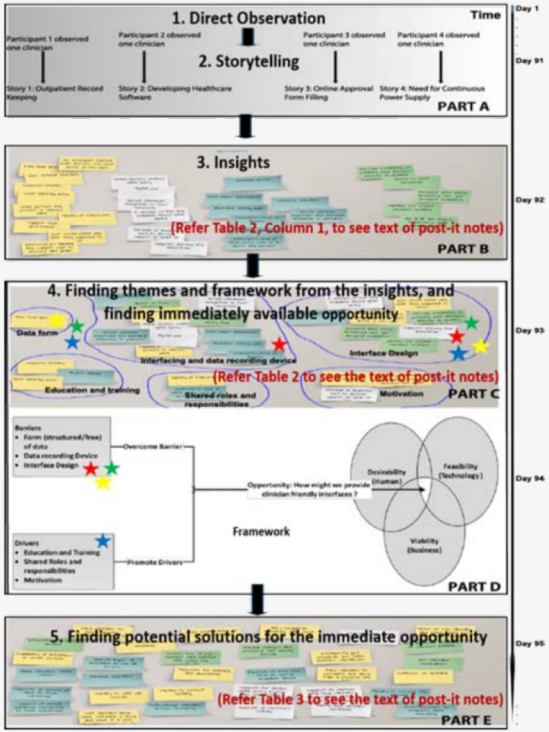
Framework:	HCD	**Author:**	Kumar A, Maskara S	**Year:**	2015
Topic:	Hospital software	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:		**Type of the source:**	Research article	**Link:**	Link

Clinicians often report a loss of productivity and frustration while using healthcare software. There is a pressing need to understand the clinicians' experiences about healthcare software. This study was a small pilot study intended to reveal clinicians' experiences towards healthcare software usability. Four participants and two facilitators from India participated in this study. This study used the human-centred design approach that included three phases – observation, pattern identification, and ideation and delivery. Each phase involved: 1) techniques – brainstorming, voting, discussion, and mutual consensus among participants; 2) tools – pen, papers, flip charts, sticky notes, and marker pen. This study revealed 29 insights, six themes, a conceptual framework with an immediately available opportunity, and 32 potential solutions for the identified immediate opportunity.

The study results suggest that clinicians' experiences towards healthcare software usability are highly affected by the interface design of the healthcare software. Therefore, intuitive interface design is an immediately available opportunity. We received 32 recommendations for designing intuitive interfaces of the healthcare software. Interface designers may keep these 32 recommendations in their mind, as a broad wish list of clinicians, in the early stages of design.

Features IDEO's HCD framework (Fig. 2), also providing a detailed timeline incl. methods, tools etc. (Tab. 1) or actual results (insights; solutions/ 32 usability/ requirement recommendations) in Tab. 2—3, visually summarized findings (Fig. 3).

Observation (ethnography; interviews; storytelling), **brainstorming (during workshops?)**, were used as main design methods (Cp. Tab. 1).



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Inclusivity:		**Type of the source:**	Research article	**Link:**	Link

See esp. approach and tools above that **could** generally **be valid for HCD initatives**, at least for other software development projects (insights and requirements!, cp. Fig. 2—3). Table 1 could serve as a template for first 95 day/ phases 1—5):

Timeline	*Phases*		*Steps*	*Techniques*	*Tools*
Day 1–Day 91	Observation	1	Direct observation	Ethnography, interview, discussion, documentation	Pen and paper
		2	Storytelling		
Day 92–Day 94	Pattern identification	3	Deriving insights from stories	Brainstorming, voting, discussion, and mutual consensus	Pen, paper, flip-charts, marker-pen, sticky-note
		4	Finding themes and framework from the insights and finding immediately available opportunity		
Day 95	Ideation and delivery	5	Finding potential solutions for the immediate opportunity	Brainstorming, voting, discussion, and mutual consensus	Pen, paper, flip-charts, marker-pen, sticky-note
		6	Categorise the solutions into group and find one group for prototype development (our future study)		
		7	Prototype development (our future study)		
		8	Implementation (our future study)		

#39: Designing mHealth Applications for Developing Countries

Framework:	Design Science Research	**Author:**	Menschner P, Prinz A, Koene P, Köbler F, Altmann M, Krcmar H, Leimeister JM	**Year:**	2016
Topic:	Mobile Health Apps; developing countries	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

The effective use of mobile IS offers great opportunities for improving health systems in developing countries and enhancing their quality of life. A case in point and, hence, an interesting research subject is Papua New Guinea for being a country with one of the highest maternal mortality rates in the world. Despite the opportunities, many mHealth solutions remain prototypical due to their design and lack of empirical evidence and just little literature discussing success factors exists. To overcome this problem, we derived Design Requirements for the implementation of an mHealth app. We followed a Design Science Research (DSR) approach (a) embedding a triangulation of a literature study, a user survey and on-site observations, (b) working in a cross-cultural and interdisciplinary team and (c) evaluating the Design Requirements ex-ante by taking the example of an mHealth app to support midwives in Papua New Guinea. Practitioners, IS researcher, even design- or behaviourism-oriented, as well as transdiciplinary researchers can use the Design Requirement Framework for, on the one hand, design and implement applications in developing countries and, on the other hand, to take single already justified Design Requirements as starting point for a detailed investigation.

Define and highlight the **Design science research approach** as common in Information Systems disciplines following Hevner et al. and Sonnenberg & vom Brocke (Fig.on the next page).

Use of

i. Triangulation of: a literature study**, a user survey and on-site observations,

ii. A cross-cultural, interdisciplinary team incl. targeted users (midwives from rural Papua-New Guinea), mediated by prototyping

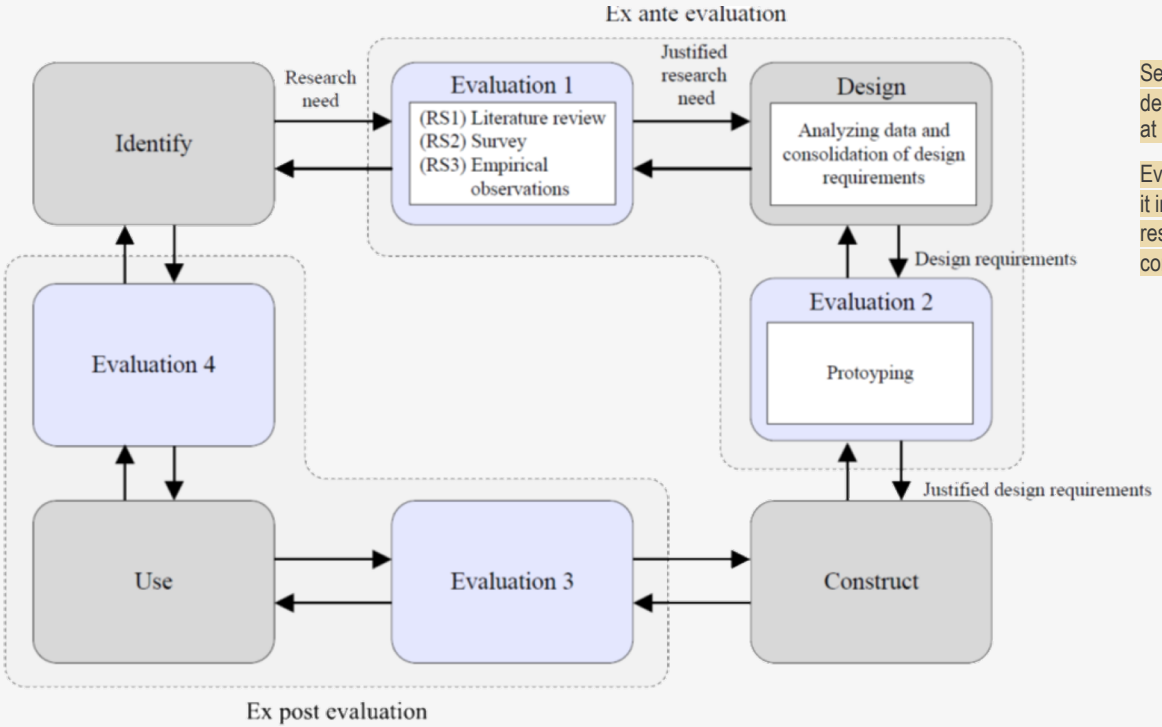
** resulting in **5 success factors** for mHealth: **User-oriented design** – Take special background into account; Technology choice – Build on convening technology and user knowledge; Simplicity – Focus on reachable goals instead of providing a holistic approach; Exploitation of synergies – Provide interoperability between applications; Strong partnerships for sustain[ing solutions] – Integrate partners to the mHealth project

The subsequent observations produced mHealth **user-related Design Requirements** like

- DR5: Integrate different languages or symbols (illiteracy!)) and design the interface as familiar as possible (UI like Facebook etc.) to include all user groups
- DR7: Scale the solution's needs adequately (data volume may be limited and sporadically accessible)
- DR8: use of gamification elements as motivational aspect (and also networking functionalities, cp. DR11)

#39: Designing mHealth Applications for Developing Countries

Framework:	Design Science Research	**Author:**	Menschner P, Prinz A, Koene P, Köbler F, Altmann M, Krcmar H, Leimeister JM	**Year:**	2016
Topic:	Mobile Health Apps; developing countries	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link



See esp. approach (including empirical / research tools) above and design requirements that **could** generally **be valid for design** issues, at least for Healthcare/ users in developing countries.

Even though it does not mention inclusive design, it seems really about it in a sense of integrating disadvantaged persons (partly illiterate, resource-restricted, difficult language/ communication and labor conditions).

#40: Collaborative Design in Virtual Environments

Framework:	Collaborative design (design, co-creation)	**Author:**	Sachs, Hans; Menezes, Carolina; Karuzys, Mathias	**Year:**	2021
Topic:	Architecture/ Design, VR/AR	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:		**Type of the source:**	Article	**Link:**	Link

Architectural modelling and fabrication is changing dramatically and will change further due to computer and algorithm controlled and interconnected processes. Cross linking of software, plug-ins, scripts and apps – also originating from disparate fields such as product design, computer science, mathematics, mechanical engineering, civil engineering and media production – represents one of the major future tasks for architects, engineers and partners involved in the building sector. The interconnection and manipulation of software tools from various areas enables new opportunities and sets new standards for modelling, simulation, visualisation, operation of buildings and structures. Especially with these cross disciplinary tendencies in various technology driven and affected sectors, new potentials and opportunities open up in creative, social and organizational processes.

Today's teaching of CAD in architecture relies widely on the mediation of specific software in various aspects of design and production processes. Usually, it consists mostly of training courses and the interposition of applied examples. Within the context of computational tools, higher education must focus more on new working methods and processes, like Virtual Reality.

Defines and advocates **collaborative design**.

- Both environment set-up (Software/ Hardware) and
- Formats **for virtual (university) learning settings in context of collaborative design** (3D-Modelling; "Virtual environments and immersive technology thus serve as an additional tool to promote collaborative design").

See esp. approach and tools (VR/ AR) above that **could** generally **be valid for participatory design**, at least for design-related university teaching.

Careful: Even though it mentions inclusive design, it seems not really about it in our sense of disadvantaged persons.

#41: Participatory Design Going Digital: Challenges and Opportunities for Distributed Place-Making

Framework:	Participatory design	**Author:**	Slingerland, Geertje; Murray, Maria; Lukosch, S; McCarthy, John; Brazier, F	**Year:**	2022
Topic:	Community Building (Place-Making)	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

COVID-19 has urged researchers to explore new options for distributed participatory design, as physical meetings and workshops became unfeasible. This situation posed new challenges but also opportunities, in particular with respect to engagement and inclusion. This paper focuses on distributed PD with Irish teenagers to support place-making during this period: to build relationships with each other and the community. In a two-week online summer school, teenagers explored a concern or highlighted a unique aspect of their local community and designed digital artworks in response. Activities and materials were designed to support reflection, empowerment, inclusiveness, emergence, and playfulness for participatory place-making. Analysis of the summer school provides insights and guidance on the design of online PD for engaging experiences, especially in the context of place-making.

Features **Inclusion** as “a principle strongly reflected in PD through its democratic foundation, with participation its defining quality”. **Inclusive design** is one of 5 principles for Participatory Design (besides: reflective, playful, empowering, emergent) and **dependent on gatekeepers and community leaders** to make sure all voices are included and finding the means that participants are intrinsically motivated and talk to each other as equals. Designers of PD processes have to **consider carefully who to invite to each PD session and recommends Low-Tech Prototyping**.

Establishes alternatives for analogue workshops (so far been state-of-the-art in participatory design/ PD):

Distributed or Online PD with synchronous interaction is a challenge fostered by CoViD, but can improve mutual understanding between different stakeholders. The responsible facilitator and online tools should give ‘intelligent assistance in the design process’. Use of complementary applications like Mobile Diaries can contribute to the design process. Downsides can be

- **Greater power asymmetries** (incl. greater capacity for inequalities in terms of availability of devices, quality internet connection and software; cp. also Tab. 4);
- Identifying, keeping, including and monitoring participants is more challenging in a distributed format.
- Engagement suffers from inevident contribution,
- Difficulties to develop trust for real discussions amongst equals and opportunities for reflection are limited.

However, digital PD methods have been found to be **very suitable in ethnographic** stages of **design** processes. Though, strong facilitation is needed in online settings, to keep participants involved and to foster interactions that build trust. Same is true for constant monitoring to support participants during their engagement, check for representation, and to keep track of group dynamics.

Online PD requires preparations and involvement of the researcher. As mentioned above, distributed settings ask for a **good selection of tools** and a suitable process, with fewer options to improvise. Use a platform that is not very limited in how participants can interact (interaction in distributed settings is less straightforward, hence multiple options need to be available for different kinds of participants to join).

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Topic:	Community Building (Place-Making)	**Researcher:**	Rüdiger Breitschwerdt	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

Online Summer School with pre-questionnaire, (6) **consecutive workshops** and a poster session (Table 1), 3 focus groups and a post-questionnaire were used as design method (Cp. Fig 1):

	Workshop topic	Homework activity
W1	Introduction	Analyse existing artwork
W2	Brainstorming & critiquing ideas	Develop idea
W3	Develop prototypes	Strategy to share idea
W4	Sharing the artworks	Create social media post
W5	Finalising the artworks	Prepare presentation
W6	Final presentations	Fill our post-questionnaire
W7	Poster session	n.a

Recommends Online collaboration via Mails, WhatsApp and whiteboard tool Miro™ (cp. Fig. 1; sample outcome in Fig. 2; Section 4.1.1).

Concerns on INCLUSIVE online PD (section 4.1.2): Participants on mobile phones and tablets could not view both the Miro™ board and the Zoom™ chat at the same time, complicating interaction during parts of the workshops. Anonymous feedback/ trolling of content was also inefficient. It has proven difficult to motivate participants or engage them in activities. The field notes reflect the challenge of having participants remotely engage in a discussion or react to each others' statements and ideas.

Online PD results in use of more homogeneous tools/ media, but creates more heterogeneous ideas (p. 690)!

See esp. approach and tools above that **could** generally **be valid for inclusive PD/ participatory design**, at least for other community projects (or teambuilding)? The other four **PD principles, like empowering** (Sections 2.4 and 4.4).might also fit our understanding of inclusiveness.

The Summer School can topic-independent be mapped to Workshops during (also higher) education courses.

Even though it does mention inclusive (design) explicitly and satisfying my personal prerequisites for such, it could be questionable from external side if 'real' inclusion since 'only' integrating (slightly?) disadvantaged persons or in a challenging phase of life (teenagers)/ in rural or rurban circumstances ('challenges' or differences posed by growing digitalisation, urbanisation, and migration).

#42: Design Thinking for Sustainable Development

Framework:	Design Thinking, Sustainable Development	**Author:**	Mara Zeltina	**Year:**	2021
Topic:	Education for sustainable develop. (ESD) at HEI	**Researcher:**	Klaus Fischer	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

The paper describes how design thinking methodology is used in a master course at Liepaja University, focusing on ESD.

Research question: “Is it possible that based on various theories, methods and practices of DT in the contextual interaction with external systems to define DT as a method, which promotes ESD in Master studies?”

Method:

- Literature review (small)
- Qualitative case study

“This research was focused on how a sustainability approach can be merged with design thinking to develop socially responsible and environmentally sustainable products and services. The case study has been carried out in the master’s study course Sustainable Development Planning. Some of basic principles and stages of design thinking, such as empathy, creativity, collaboration, responsibility and interdisciplinary approach have been tested by using students project work evaluation regarding certain criteria and survey after the study course.”

Identified characteristics of DT in literature review build a bridge to inclusivity and ESD:

- Human-oriented;
- Group collaboration in an interdisciplinary team;
- Creation of ideas and experimentation;
- Prototyping;
- Creation of values

Explicitly using DT for education at HEI (Master Course “Sustainable Development Planning”)

The case study deals provide two relevant aspects for our work:

- A broad understanding of DT (complying with inclusivity and ESD)
- Use of DT in the context of education at HEI, with (short) description of the experiences and challenges (Conclusion part)

#43: DESIGN THINKING: A METHODOLOGY TOWARDS SUSTAINABLE PROBLEM SOLVING IN HIGHER EDUCATION IN SOUTH AFRICA

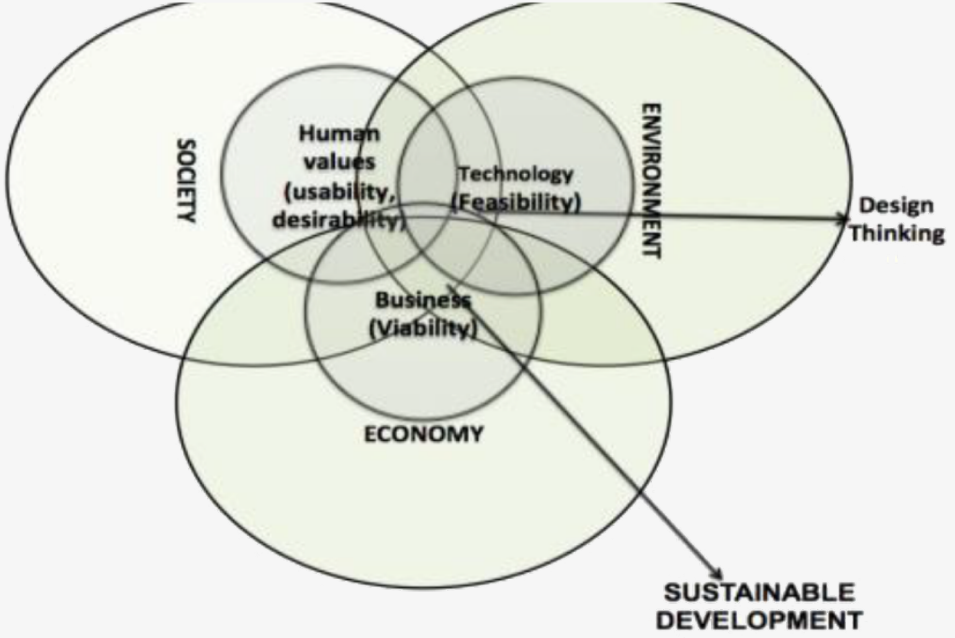
Framework:	Design Thinking	**Author:**	Keneilwe Munyai	**Year:**	2016
Topic:		**Researcher:**	Klaus Fischer	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

A rather short conceptual paper, elaborating on the synergies and links between DT and sustainable development paradigm in the context of higher education.

Author sees education as an important precondition for inclusivity and a powerful mean against exclusion and develops a framework integrating SD and DT.

- Highlighting the education (and DT in education) as a means against exclusion
- Proposing a framework integrating SD and DT

"While sustainable development focuses on society, environment and the economy, design thinking focuses on human desirability, technological feasibility and business viability which are all critical to development. When the sustainability principles are combined with the design thinking methodology can have more impact towards promoting and achieving sustainability."



The paper addresses inclusivity in a (for our project) indirect, but very important manner: It emphasises the high relevance of education for inclusion as "in South Africa [..] education was used as a means of exclusion, separating races, class and cultures". Education using DT methodology is seen as an important step here.

The developed "Framework juxtaposing Design Thinking on the Sustainable Development", linking both subjects can also be useful for our topic: Inclusion and meeting human needs are at the core of the sustainable development paradigm, the synergies with DT can help to understand "Inclusive DT".

#44: CDIO AS CURRICULUM MODEL FOR EDUCATION FOR SUSTAINABLE DEVELOPMENT

Framework:	CDIO, Design Thinking	**Author:**	Sin-Moh Cheah	**Year:**	2014
Topic:	Edu. for Sustain. Develop, Chemic. Product Design	**Researcher:**	Klaus Fischer	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

The author presents a curriculum model used at Singapore Polytechnic for a Diploma in Chemical Engineering in the "Final Year Projects (FYP)"-phase;

The model integrates three core elements: CDIO-Approach (Conceive, Design, Implement, Operate), Design Thinking and the concept of "Appropriate technology" (which is the result after an inclusive technology development);

The author introduces three levels of education in relation to sustainability and emphasize that design thinking is needed to identify the root cause of sustainability-related problems;

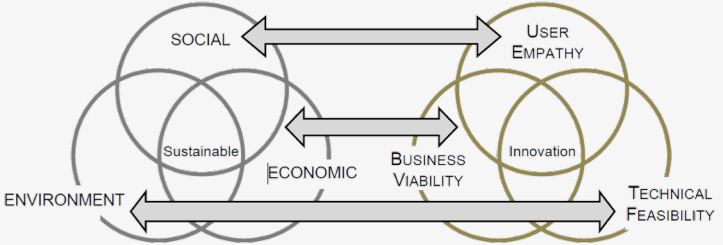
The presented curriculum model aims at "level three", meaning third-order transformative learning where inclusivity is key:

"Third-order transformative learning where our students work closely with communities at the bottom of the pyramid to jointly formulate a workable solution for the people who needed help the most; adding values to the community-in-need".

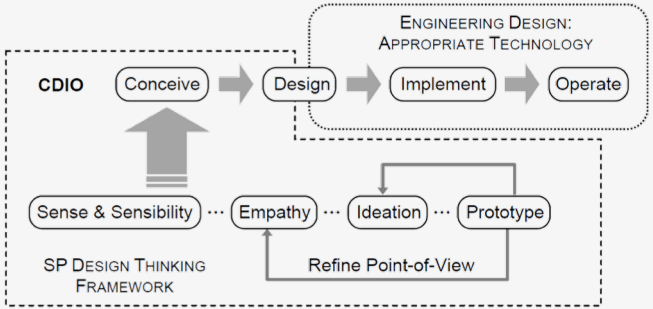
Focusing on the concept of "appropriate technology", which core principle is to include local communities in technology selection and development, innovation and implementation, all in an environmentally sustainable manner; these technologies are often "low tech", small scale, energy efficient, labor-intensive, and controlled by the local community.

- Curriculum model integrating DT in technically-oriented HEI
- The concept of "appropriate technology" seems to be very fruitful for our approach as it explicitly focuses on inclusivity, producing inclusive technological solutions for disadvantaged communities "at the bottom of pyramid"
- Creates a link to technological solution for global south/emerging countries AND to a "back to the roots" of locally viable "simple, inexpensive and clever" technological solutions

Mapping between DT and SD



How Design Thinking and Appropriate Technology support phases of CDIO



#45: Design Thinking for Sustainable Development

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#46: Multisensory Inclusive Design Education: A 3D Experience

Framework:	Design thinking – inclusive design	**Author:**	Burçak Altay	**Year:**	2017
Topic:	Education	**Researcher:**	Eva Malichova	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

The paper discusses an exercise in a Human Factors / Ergonomics course in interior design where students create 'A 3D Experience'.

- Appreciating human diversity in all its aspects ranging from age, sex, socio-economic conditions, and different abilities to emotions, feelings, and psychological requirements, can increase the quality of user-centred design. This calls for an **empathic design approach**. Empathic understanding refers to stepping away from a designer role to identify with the actual users who will engage with the designed product/environment.
- Inclusive design education:
  - user representations of designers during the design process in the absence of users, created by scenarios and personas, have a danger of creating stereotypes, with the exclusion of certain user groups
  - In empathic modelling, the designer may simulate a specific interaction with a product/space and relate to experiences different from her everyday relationship
  - simulation methods emphasizing inclusive design have demonstrated that students expanded their learning in both cognitive and affective domains with observed sensitivity towards inclusive design
- Multisensory design:
  - a person may have full ability, moderate ability, partial ability, and minimal or inability, which may reduce or prevent the appropriate use of certain products/spaces (Clarkson 2008). These capabilities include sensory, motor, and cog nitive domains. The visual, tactile, auditory, olfactory, and tasting domains constitute the sensory domain. Motor capabilities comprise locomotion, reaching and stretching, and dexterity. Cognitive capabilities, on the other hand, include intellectual functioning and communication.

Case study **3D experience to Increase Inclusive Design Awareness** – results:

- The students were expected to explore and construct their own knowledge in relation to space – therefore, connect with their own bodies and senses. Within a three-week duration, the students voluntarily formed groups of three–four and spent off-class hours to develop their project. During this time, they received one critique from the instructor on their initial ideas and intentions of production, suggestions for material use,etc. (examples of projects are part of the paper)
- Students largely find the assignment successful on the issues raised regarding learning of HFE knowledge and universal design, creative skills, and creating enthusiasm for the subject. They also believe the assignment is effective as a part of the syllabus.
- The assignment encouraged them to understand and/or experience the human–environment relationship in a much better way
- Students emphasized learning through experiencing with the senses (13 students, 19%).
- They also observed how people respond to different sensory stimuli. Moreover, probably in accordance with the different 3D products, students felt the exercise increased awareness of the effect of light, textures, and colours on them, allowing them to feel textures of surface, or material experience, as well as perceptions of forms and objects. Students could also experience different emotions associated with the qualities of space.
- The students commented that the exercise transformed their attitudes towards inclusive design in a positive way

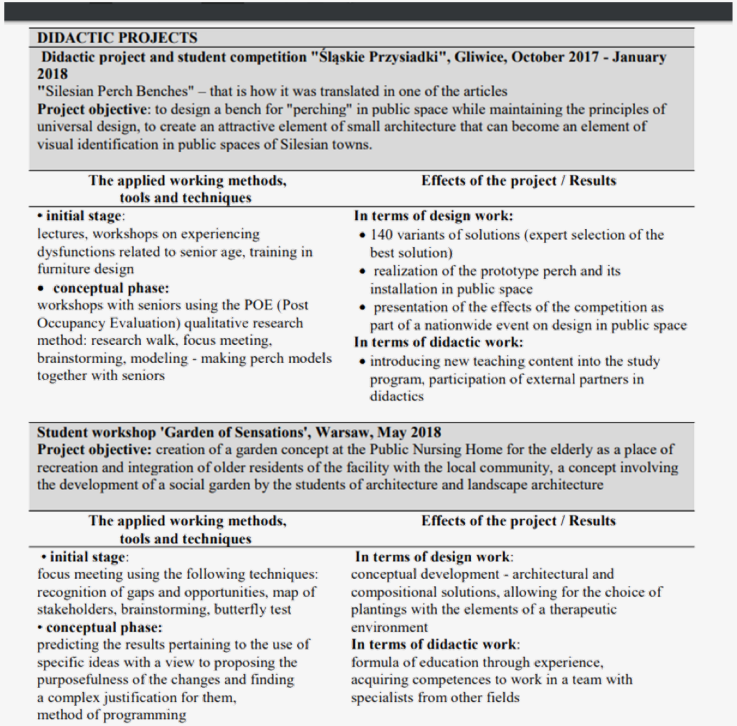
The paper confirms that hands-on training and immersion in the role of "people from underrepresented groups" is the best way how to design solutions for them. We can use this paper to explain and confirm that this approach works

#47: Implementing Inclusive Design in Architectural Education and Design Practice

Framework:	Design thinking – inclusive design	**Author:**	Anna Szewczenko, Sylwia Widzisz-Pronobis	**Year:**	2020
Topic:	Education	**Researcher:**	Eva Malichova	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

The paper focuses on working methods in didactics and in design practice in terms of the implementation of the inclusive design concept. It obliges the students and participants to be involved in the design process in order to recognize the needs and preferences of different user groups. Additionally, since the development of ICT technology allows us to increase the availability of space, the expansion of the range of tools in the design process requires the expansion of the knowledge of future designers. Therefore, the authors pose questions: how to educate future architects in this context? what tools and technologies to offer to local communities so that they can actively participate in such design processes?

- Inclusive Design, like Universal Design and Design for All, can be defined primarily as a design process aimed at the development of optimal solutions for social groups being at risk of marginalization, or users whose needs and preferences differ from standard requirements
- "Principally, it should be acknowledged that "inclusive design" is not a fixed set of design criteria, but a constantly evolving philosophy. The goal of creating beautiful and functional environments that can be used equally by everyone, irrespective of age, gender or disability requires that the design process must be constantly expanding to accommodate a diverse range of users, as we develop a greater understanding of their requirements, desires and expectations."
- The inclusive design methodology distinguishes four main design phases: management (defining objectives and stages of the design), defining users' needs, generation of ideas and testing of the design concepts.



DIDACTIC PROJECTS

Didactic project and student competition "Śląskie Przysiadki", Gliwice, October 2017 - January 2018

"Silesian Perch Benches" – that is how it was translated in one of the articles

Project objective: to design a bench for "perching" in public space while maintaining the principles of universal design, to create an attractive element of small architecture that can become an element of visual identification in public spaces of Silesian towns.

The applied working methods, tools and techniques	Effects of the project / Results
• **initial stage**: lectures, workshops on experiencing dysfunctions related to senior age, training in furniture design • **conceptual phase:** workshops with seniors using the POE (Post Occupancy Evaluation) qualitative research method: research walk, focus meeting, brainstorming, modeling - making perch models together with seniors	**In terms of design work:** • 140 variants of solutions (expert selection of the best solution) • realization of the prototype perch and its installation in public space • presentation of the effects of the competition as part of a nationwide event on design in public space **In terms of didactic work:** • introducing new teaching content into the study program, participation of external partners in didactics

Student workshop 'Garden of Sensations', Warsaw, May 2018

Project objective: creation of a garden concept at the Public Nursing Home for the elderly as a place of recreation and integration of older residents of the facility with the local community, a concept involving the development of a social garden by the students of architecture and landscape architecture

The applied working methods, tools and techniques	Effects of the project / Results
• **initial stage**: focus meeting using the following techniques: recognition of gaps and opportunities, map of stakeholders, brainstorming, butterfly test • **conceptual phase:** predicting the results pertaining to the use of specific ideas with a view to proposing the purposefulness of the changes and finding a complex justification for them, method of programming	**In terms of design work**: conceptual development - architectural and compositional solutions, allowing for the choice of plantings with the elements of a therapeutic environment **In terms of didactic work**: formula of education through experience, acquiring competences to work in a team with specialists from other fields

#47: Implementing Inclusive Design in Architectural Education and Design Practice

Framework:	Design thinking – inclusive design	**Author:**	Anna Szewczenko, Sylwia Widzisz-Pronobis	**Year:**	2020
Topic:	Education	**Researcher:**	Eva Malichova	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

Results:

- Inclusive design as an action that facilitates functioning in the built environment; care for the comfort of users: it requires knowledge of how to use space by different groups of users with varying degrees of fitness, and that is why education through experience is important,
- Inclusive design as an action focused on the accessibility of space: through variable accessibility, we obtain a new value of the built environment as an unbiased space, allowing the realization of goals for various user groups, as well as the introduction of new values; therefore, it is a creative process that requires seeking for innovative solutions, which implicates the stimulation of creativity and innovative thinking,
- Inclusive design as a process involving users: thanks to specific research tools and techniques we can obtain the most optimal solutions and an individual approach to the topic,
- Inclusive design with the support of modern ICT technologies, which offer the users many opportunities to compensate for psychophysical dysfunctions and related to the limitations in social life; they provide an opportunity to simulate certain solutions and create a new dimension of accessibility and quality of space; yet, they are only a tool to achieve the intended goals.

- Definitions of inclusive design
- Types of projects they did

Table 1. (continued)

The applied working methods, tools and techniques	Effects of the project / Results
Didactic project and student competition "House in Bytomska Street", Gliwice / Tarnowskie Góry, November 2019 - January 2020 **Project objective**: the concept of developing additional space in a building and in its surroundings to increase the scope of activities and social services for the elderly offered by the daycare center for the elderly, defining the potential significance of the daycare center for the local community,	
initial stage - pre-project studies: • qualitative research method, • case study method, • action research method • techniques: focus meeting, individual interviews, walk through, behavioral mapping, non-participant observations **conceptual phase:** consultations to assess the functionality of the solutions of the concept	**In terms of design work:** variant conceptual studies on the adaptation of the attic of the daycare center building and its surroundings **In terms of didactic work:** expanding competences in terms of the application of techniques in pre-project research and the collection of information from the users
Architektour - workshops with Architecture students of Polish universities, Bytom, III 2017 **Project objective**: to design interventions engaging the local community in Bytom in the Rozbark District and to design solutions that respond to the needs of the community, in particular the senior environment, which, according to preliminary estimates involving the development of the Municipal Revitalization Program, is most exposed to the risk of being excluded due to the lack of offer responding to their needs.	
• action research method • talks with the users by way of the sensory mock-up of the Barbara Square (the mock-up of space using materials corresponding to different tactile sensations, engaging in conversations about emotions experienced by the users when using space) • research walk with a survey done with the users Animation of children on the Barbara Square combined with the observation and interview with the children about their needs in public space	**In terms of design work:** • drawing up concepts for the development of the Barbara Square; the concepts were used by the Municipal Administration of Roads and Bridges to develop the functional-utility program to raise funds for investments in public space. **In terms of didactic work:** • broadening competences in the use of techniques in pre-project research and obtaining information from the users • experience gained in the creative design of research tools

#48: How to get the girls Gaming: A Literature Study on Inclusive Design

Framework:		**Author:**	Mozelius P, Humble N, Sällvin L, Öberg LM, Pechuel R, Fernández -Manjón B	**Year:**	2022
Topic:	Gaming – Girls – inclusive design	**Researcher:**	Eva Malichova	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

The study focused on gathering requirements for the design of serious games where girls should not feel excluded. The question addressed: "Which design concepts are important if girls should be engaged in serious gaming?“

- Girls have expressed a greater preference and more positive preferences for games that encourage creativity,where creativity could be encouraged by features for modifying game characters and game elements, or the possibility to create artwork for use within or outside the game
- Girls prefer to create, modify and to avoid the violent feedback that appears in combat games
- Gaming girls appreciated functionality that enables them to customise components in the game environment. Something that helped the girls to express themselves and to demonstrate their preferences
- Girls prefer indirect competition without violence
- Girls have a stronger tendency to design games with a mix of male and female characters, with more options to choose different game avatars
- Female chess elite players' approach to competitive chess is shaped by the belief that they have something to prove to males
- Instead of violence in the gameplay, girls want exploration, collaboration and challenge in a game design with more realistic adventures and activities in game environments with sophisticated graphic and sound design
- In a game with a female protagonist the girls' interest in technical subjects increased after playing the game.

I would use this as one of the examples/tasks for students

#49: Responsive inclusive design (RiD): a new model for inclusive software development

Framework:		**Author:**	Moreno Martínez C, Recas Piorno J, Escribano Otero JJ, Guijarro Mata-García M	**Year:**	2022
Topic:	Responsive inclusive design - software	**Researcher:**	Eva Malichova	**Language:**	English
Inclusivity:	Yes	**Type of the source:**	Research article	**Link:**	Link

In the paper, a model for designing and constructing software applications (RiD—Responsive inclusive Design) defined for inclusive software is described. RiD extends the involvement of the user with disabilities to the entire software life cycle, in different roles, and taking into account the changing nature of the user profile in the evolution of the product.

RiD is conceived as a model that follows the software life cycle approach. RiD particularizes¨existing models by applying User centric product design, and an iterative process with specifc add-ons for disabled users:

a) The user is an active actor in the design and validation of the system from the beginning of the project;

b) It is recommended to organize the development project based on iterative models in the design and verifcation phases, involving users with inclusive needs and/or feld experts; and

c) It promotes the design beyond the product delivery,including into the product design the changing nature of user characteristics over time (e. g. the degree of blindness that evolves over time).

To be aware of RiD