

System Innovations in Design for Aging - A Research-Driven Multi-Stakeholder Framework for Transforming Health Systems

Jonas Rehn, Darmstadt University of Applied Sciences, Germany

The European Conference on Aging & Gerontology 2019
Official Conference Proceedings

Abstract

In many cases design approaches use a systemic point of view in order to gain insights that inform the process of developing new products and services or improve existing ones. At its best, design uses research methods as well as scientific evidence and creativity tools to tackle wicked problems in fields such as sustainability or health care. However, in order to have a long-term and effective impact design approaches must not only use a systemic point of view for isolated innovations but need to create or at least facilitate system innovations. Following the ideas of Geels and Schot (2007), Kemp et al. (1998) and Bizer and Führ (2015), system innovations are created at the intersection of technological, social and institutional areas requiring a high level of stakeholder engagement and using a transdisciplinary mind set. While this approach is state of the art in current research on design for sustainable development, it offers great potentials for design in the context of health care and aging. This paper presents a framework comprising of suitable methods and starting points for design research and practice to create, initiate and facilitate system innovations in the context of health and wellbeing.

Keywords: System innovation; transdisciplinarity; research-driven design; evidence-based design; salutogenic design; psycho-socially supportive design; design for aging; health care design; design research, design methodology

iafor

The International Academic Forum

www.iafor.org

Introduction

According to the United Nations (2019) people above the age of 65 are the fastest-growing age group worldwide. At the same time, due to improving standards in hygiene and healthcare, life expectancy is constantly rising causing the number of persons aged 80 years or above to be projected to triple, from 143 million in 2019 to 426 million in 2050 (UN, 2019). This demographic shift not only changes the proportions of various age groups but leads to a societal development from what can be described as the “fourth generation” (Higgs and Gillear, 2015) as the classical phase of retirement can be divided into a more active and independent phase and a rather dependent and cared phase.

From a societal point of view, this development poses both chances and challenges to the overall population as it raises questions concerning access to services, engagement and participation in society as well as special offers and demands for healthcare and nursing. Many disciplines have created a versatile set of both conceptual and technological solutions as well as evidence concerning single elements of these challenges. For instance, for decades, care giver strain has been regarded as a severe danger for public health (Schulz and Beach, 1999). At the same time an increasing body of knowledge shows the profound effects the built environment can have on various aspects of aging ranging from walkability (e.g. Carr et al., 2011) to the degree of social interactions (e.g. Sommer and Ross, 1958). However, most design approaches and concepts focus on single elements as opposed to system innovations in the sense the term is used in the context of sustainable development (Geels and Schot, 2007). Due to the complexity and openness of these challenges associated with the aging population, “wicked problems” (Rittel, 1973) and with regards to the limited time frame even “super wicked problems” (Levin et al., 2012) like these require solutions on a system level focusing on concepts that integrate societal, technological and institutional aspects.

Transdisciplinarity

The herewith proposed framework for system innovations follows the basic structure of the transdisciplinary delta analysis as outlined by Bizer and Führ (2015). Therefore, the hereby proposed framework distinguishes two modes of work. The (a.) disciplinary mode describes the classical routines and knowledge that is known to each stakeholder from its own individual professional background. Usually, disciplinary work has an established set of methods, processes and strategies of problem solving while often staying in a conceptual silo. As opposed to this, the transdisciplinary mode refers to a highly interactive process that blurs the boundaries between disciplines and domains allowing a shift a perspectives and biases. Transdisciplinarity refers to the approach of including all relevant stakeholders and practitioners throughout the process. As opposed to disciplinary, inter- or multi-disciplinary approaches, transdisciplinarity depends on including academia as well as industry, civil society and institutional parties. This strategy is based on the assumption that wicked problems usually cannot be solved by single isolated disciplinary methods and routines as the disciplinary silo mentality prevents necessary disruptive solutions to be found (see Belcher et al., 2019).

Throughout the process described in this framework both modes are relevant at different stages. One of the major challenges of this framework is the ability to switch between both modes of work and the sensitivity to understand at which point in the project which mode is relevant. Therefore, a reflective meta-perspective is required that allows to guide the overall process between both modes of work.

System innovations

System innovations in design for aging refers to the definition of system innovations as used by Elzen et al. (2004) and Geels (2005a; 2005b) with regards to sustainable development focusing on complex socio-technical systems rather than solely technological innovations. In this sense a system innovation is “a transition from one socio-technical system to another” (Geels, 2005a: 2). Classical innovations such as an improved technical principle of a vacuum cleaner or the evolution from propeller-powered to turbine-powered aircrafts do not require broader societal and institutional processes to take place. Developments such as electrical mobility or circular economy however are based on technological solutions as well as societal and institutional processes (see Kemp et al., 1998). Among other aspects, adapted consumer behavior and values, regulatory frameworks, governmental subsidies and more need to be established for technological solutions to be effective and successful. Thus, system innovations occur at the intersection of technology, society and institution. Therefore, the herewith proposed framework is based on a transdisciplinary mindset of actively including stakeholders from all three spheres to contribute and co-create a joint solution.

Transdisciplinary framework for system innovations in design for aging

The herewith proposed framework is illustrated as a process diagram switching between disciplinary and transdisciplinary mode in 6 phases (8 steps). Depending on the complexity of the context and the challenges that are associated with the problem of concern, additional iterations and alterations might be necessary.

On that note, this framework is supposed to be a conceptual guideline for transdisciplinary processes that aim at system innovations in the medical context. It is worth mentioning however, that system innovations can hardly be designed in the classical sense, but merely facilitated and enabled. The actual realization of system innovations is done by the parties genuinely involved in the system of concern. As systems are interrelated dynamic structures attempting to establish system innovations requires flexible methodological approaches and constant evaluation and reflexion. Therefore, it can be seen as a paradigm shift to the person or team guiding this process to step back from actively designing the innovation itself and enabling and facilitating instead.

With regards to medical systems in general and gerontology in particular the goal of system innovations and the complexity that is associated with it depends largely on the level of zoom and the system of interest as the medical system itself consists of many systems and sub-systems.

Therefore, the overall process and methods that are presented here are meant to be examples of one possible way of applying this framework. A certain choice of sub-

system might lead to an essentially different set of tools and methods. This applies to the amount and selection of relevant stakeholders in particular.

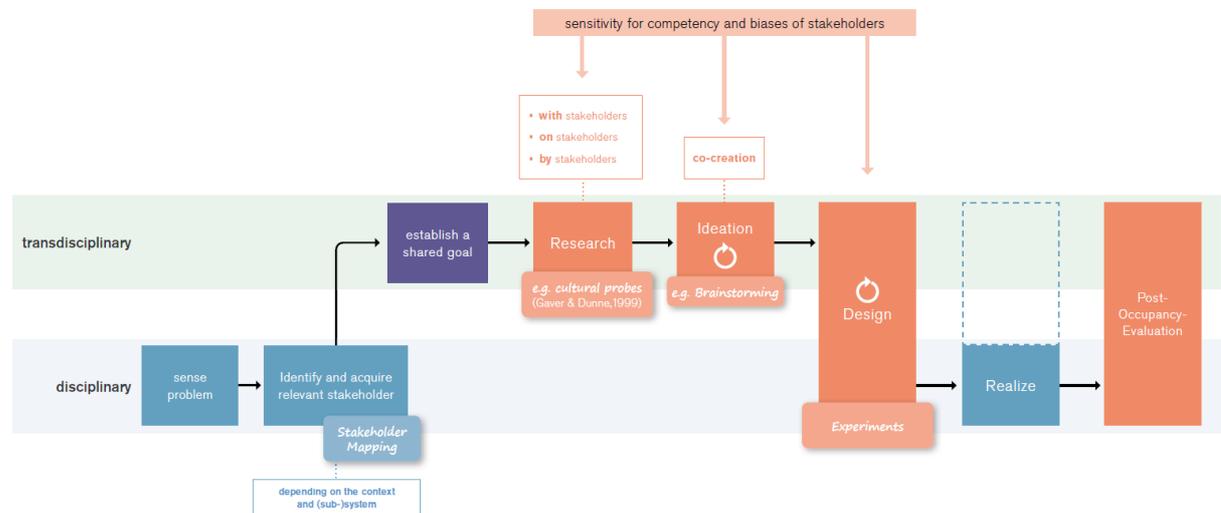


Figure 1: Transdisciplinary framework for system innovations in design for aging.

1. Problem impulse and stakeholder engagement

Like most design methodologies (e.g. Kumar, 2013) the innovation process starts with a problem impulse, a societal challenge that is sensed by one or more stakeholders. From this initial impulse onwards relevant stakeholders are identified and acquired. Since classical disciplinary knowledge and skills are needed to sense the problem and identify relevant stakeholders, this stage is associated with the disciplinary mode of work. In order to identify and acquire relevant stakeholders, a rigorous and comprehensive stakeholder mapping is needed. As with system innovations, relevant stakeholders should cover the societal, technological and institutional sphere of the problem.

With regards to gerontology, depending on the system of concern, stakeholders might include a big variety of groups including elderly and care giver as well as nursing staff, nursing home management and many more. One of the big challenges in the process is to facilitate discussion and negotiation on an equal footing overcoming hierarchies, biases and stereotypes by all stakeholders.

2. Establishing a shared goal

As opposed to classical innovations - for instance inside one single enterprise - system innovations require the inclusion of many different parties often equipped with opposing goals, mindsets and biases. Therefore, a mutual understanding of the problem and the establishment of a shared goal is of high importance in order to be able to initiate effective and sustainable system innovations. This goal needs to refer to the societal, technological and institutional aspects of the problem.

3. Research

Based on a shared goal, objective and valid insights concerning the stakeholders and the context are needed to inform the process of concept development. Therefore, a research phase should be conducted with, by and on stakeholders to gain a broad and concise understanding of the problem. While research on stakeholders stands for classical empirical methods focusing on the stakeholders (e.g. Visocky O'Grady and Visocky O'Grady, 2017), research by and with stakeholders refers to the active involvement and participation of stakeholders in collecting and decoding data (e.g. Gaver and Dunne, 1999). Especially with regards to the context of ageing and nursing, getting access to the tacit knowledge of various stakeholder groups is of high importance in understanding the current state of the system. Systems evolve and change in dynamic processes while values and norms as well as habits and routines constantly affect the people in these structures.

4. Ideation and Design

Using the insights and tacit knowledge acquired during the research phase a classical iterative ideation and design process is conducted to generate viable concepts and solutions. Again, this phase follows the principles of co-creation and stakeholder engagement. Depending on the size and composition of the group as well as the structure of the problem tools from the sphere of design thinking (e.g. Kumar, 2013) can be useful. In the later stage of the design process experiments can be seen as a valuable tool to test drive concepts in real life setting that can be scaled and adapted according to their performance. For instance, if the challenge of concern focuses on a system innovation with regards to nursing, new concepts could be installed in a small nursing home or just on department before scaling it to a broader initiative.

5. Realization

After designing and testing in numerous iterations a final concept is realized. Depending on the structure and scope of the concept, this phase can be seen as either more disciplinary or transdisciplinary, actively including various stakeholders in the realization and use phase. As opposed to classical innovations system innovations are significantly more procedural, requiring a series of steps by different stakeholders at different times. Some of these processes cannot be fully planned but need to be facilitated and monitored using a transdisciplinary meta-perspective.

6. Evaluation

With regards to system innovations evaluation is crucial. Since systems are interrelated structures that constantly change and develop in partly unpredictable ways, concepts that aim at creating or facilitating system innovations need to be evaluated throughout the design process as well as after the realization. This can be compared to classical post-occupancy evaluations in architecture (e.g. Hay et al., 2017). One of the big challenges in evaluating system innovations is to identify and quantify proper indicators that are able to measure the degree to which an intended outcome has been achieved.

Conclusion

The herewith proposed framework is supposed to give guidance in establishing system innovations in design for ageing. It is based on a transdisciplinary approach including a variety of relevant stakeholder from fields such as academia, industry, civil society and institutional parties in a co-creative process. By acknowledging the complexity of the challenges and chances that are associated with the ageing population, this framework endorses system innovations as a tool. These system innovations can hardly be designed in the classical sense, but merely facilitated and enabled. The actual realization of system innovations is done by the parties genuinely involved in the system of concern.

While this framework gives an overall guidance for the process it does not solve some critical problems that are related to transdisciplinary modes of work. To acquire the right number of stakeholders and to identify the relevant ones can be challenging. This applies in particular to the medical and nursing context, in which relevant stakeholders can have limitations that impede their participation in the process to some extent. Furthermore, especially with regards to gerontology and the diversity of systems and subsystems, this framework needs to be tested in real projects to be improved. In addition to that, more research is needed on what methods and tools are useful to support this process.

References

- Belcher, Brian M.; Claus, Rachel; Davel, Rachel; Ramirez, Luisa F. (2019): Linking transdisciplinary research characteristics and quality to effectiveness: A comparative analysis of five research-for-development projects. In: *Environmental Science & Policy* 101, S. 192-203. DOI: 10.1016/j.envsci.2019.08.013.
- Bizer, Kilian; Führ, Martin (2015): *Compact Guidelines: Practical Procedure in Interdisciplinary Institutional Analysis*. Darmstadt: Sonderforschung ökonom. u. jurist. Institutionenanalyse (Sofia-Diskussionsbeiträge zur Institutionenanalyse, Nr. 15-4).
- Carr, L. J.; Dunsiger, S. I.; Marcus, B. H. (2011). Validation of Walk Score for estimating access to walkable amenities. In: *British Journal of Sports Medicine* 45 (14), S. 1144-1148. DOI: 10.1136/bjism.2009.069609.
- Ceschin, Fabrizio; Gaziulusoy, Idil (2016): Evolution of design for sustainability: From product design to design for system innovations and transitions. In: *Design Studies* 47, S. 118-163. DOI: 10.1016/j.destud.2016.09.002.
- Elzen, Boelie; Geels, Frank W.; Green, Kenneth (2004): *System innovation and the transition to sustainability. Theory, evidence and policy*. Cheltenham, U.K., Northampton, Mass: Edward Elgar.
- Gaver, Bill; Dunne, Tony; Pacenti, Elena (1999). Design: Cultural probes. In: *interactions* 6 (1), S. 21-29. DOI: 10.1145/291224.291235.
- Geels, Frank W. (2005a). *Technological transitions and system innovations. A co-evolutionary and socio-technical analysis*. Cheltenham, UK, Northampton, MA: Edward Elgar.
- Geels, F. W. (2005b): The dynamics of transitions in socio-technical systems: A multi-level analysis of the transition pathway from horse-drawn carriages to automobiles (1860-1930). In: *Technology Analysis & Strategic Management* 17 (4), S. 445-476. DOI: 10.1080/09537320500357319.
- Geels, Frank W.; Schot, Johan (2007). Typology of sociotechnical transition pathways. In: *Research Policy* 36 (3), S. 399-417. DOI: 10.1016/j.respol.2007.01.003.
- Hamilton, D. K. (2003). The Four Levels Of Evidence-Based Practice. In: *Healthcare Design*, S. 18-26.
- Hay, Rowena; Bradbury, Simon; Dixon, Dylan; Martindale, Kat; Samuel, Flora; Tait, Alex (2017). *Building Knowledge. Pathways to post occupancy evaluation*. [S.l.]: RIBA PUBLICATIONS.
- Higgs, Paul; Gilleard, Christopher J. (2015). *Rethinking old age. Theorising the fourth age*. London: Palgrave Macmillan.

Kemp, René; Schot, Johan; Hoogma, Remco (1998). Regime shifts to sustainability through processes of niche formation: The approach of strategic niche management. In: *Technology Analysis & Strategic Management* 10 (2), S. 175-198. DOI: 10.1080/09537329808524310.

Kumar, Vijay (2013). *101 design methods. A structured approach for driving innovation in your organization*. Hoboken, N.J: Wiley.

Levin, Kelly; Cashore, Benjamin; Bernstein, Steven; Auld, Graeme (2012): Overcoming the tragedy of super wicked problems: constraining our future selves to ameliorate global climate change. In: *Policy Sci* 45 (2), S. 123-152. DOI: 10.1007/s11077-012-9151-0.

Michalko, Michael (2006). *Thinkertoys. A handbook of creative-thinking techniques*. 2nd ed. Berkeley, Calif.: Ten Speed Press.

Rittel, H. (1973). The State of the Art in Design Methods. In: *Design Research and Methods (Design Methods and Theories)* 7 (2), S. 143-147.

Schulz, R.; Beach, S. R. (1999). Caregiving as a risk factor for mortality: the Caregiver Health Effects Study. In: *JAMA* 282 (23), S. 2215-2219. DOI: 10.1001/jama.282.23.2215.

Sommer, R.; Ross, H. (1958). Social Interaction On a Geriatrics Ward. In: *International Journal of Social Psychiatry* 4 (2), S. 128-133. DOI: 10.1177/002076405800400207.

United Nations, Department of Economic and Social Affairs, Population Division (2019). *World Population Prospects 2019: Volume I: Comprehensive Tables*.

Visocky O'Grady, Jenn; Visocky O'Grady, Ken (2017). *A Designer's Research Manual, 2nd edition, Updated and Expanded. Succeed in design by knowing your clients and understanding what they really need*. Minneapolis: Rockport Publishers.

Contact email: jonas.rehn@h-da.de