Shaping Ethical, Legal and Social Implications of the Digital Revolution Through Participation: The New Interdisciplinary Research Paradigm of Aachener DenkfabrEthik

Alexander Mertens[1,2,3(✉)], Katharina Schäfer[1], Peter Rasche[1], Christina Bröhl[1], Sabine Theis[1], Tobias Seinsch[1], Christopher Brandl[1,2], and Matthias Wille[1]

[1] Institute of Industrial Engineering and Ergonomics, RWTH Aachen University, Aachen, North Rhine-Westphalia, Germany
a.mertens@iaw.rwth-aachen.de
[2] ACE: Aachen Consulting for Industrial Engineering and Ergonomics UG (haftungsbeschränkt), Aachen, North Rhine-Westphalia, Germany
[3] CureMeD: Center for Usability and Risk Engineering of Medical Devices (CeMPEG e.V.), Aachen, North Rhine-Westphalia, Germany

Abstract. The digital era is bringing fundamental transformations to all areas of society. The penetration of everyone's professional and private lives with modern information and communication technology is constantly increasing. However, the developers responsible for this transformation are currently often oriented too heavily towards what can be accomplished technically, what is economically promising or politically desirable and not primarily towards the requirements of the future users.

The Aachener DenkfabrEthik is a success model for participatory identification of regional potential and challenges related to technology while also addressing this problem. As an independent exchange and networking platform, it forms precisely the required interface between citizens of all age groups, researchers in a wide range of disciplines, and regional decision-makers, allowing to proactively record and convey the implications of using technology. The initiative is supported actively by an interdisciplinary advisory board of regional personalities from religion, culture, politics, science, and industry.

Until now, there has been a lack of such a place of exchange in which ethical, social and legal problems can be communicated and discussed through participation together across all age groups. With the Aachener DenkfabrEthik, an incubator has been created that closes this gap and also contributes to shaping participatory geronto technology research. The cross-faculty, academic evaluation is undertaken using a multi-methodological approach in which procedures from various disciplines are combined and transformed for use in new areas of application.

This process results in an interdisciplinary research paradigm in which technical innovations are designed in a user-centric manner, implemented across domains, and assessed on a macrosocial level.

S. Bagnara et al. (Eds.): IEA 2018, AISC 824, pp. 1493–1497, 2019.
https://doi.org/10.1007/978-3-319-96071-5_152

Keywords: Participation · Digitalization · Interdisciplinary research paradigm Ethics

1 Motivation

The junior research group Tech4Age, which is sponsored by the German Federal Ministry of Education and Research and affiliated with the Institute of Industrial Engineering and Ergonomics of RWTH Aachen University, investigates the opportunities and potential of the digital revolution for the age(ing)-appropriate healthcare of the future. To do this, empirical laboratory and field studies are undertaken by the interdisciplinary team with potential users on specific research questions in order to derive practical design guidelines for increasingly digital healthcare in the future.

The digital revolution in society and above all everyday life plays a major role in this context as wishes, fears and trends need to be anticipated prospectively here in order to shape future interaction with 'digital' systems and processes according to specific target groups.

The ever faster appearance of new information and communication media is causing the world of work, healthcare and also the education and leisure sector to increasingly change, which is reflected in collective and individual communication as well as expressed through an increased desire for participation.

2 Problem Statement

Technical products and support systems in line with this trend are often not sufficiently oriented to the needs and fears of future users, which can lead to negative consequences such as stigmatization or aversion to the innovations. In order to avoid these phenomena, an interdisciplinary, age-differentiated and above all participatory approach is required.

Until now, a suitable integrated approach has been lacking for this new research paradigm within the technical sciences, hampering targeted work. As the incidence and prevalence of chronic illnesses rise with increasing age, this kind of research paradigm must particularly take into account the requirements and needs of older age groups in order to identify and eliminate context-specific barriers prospectively.

The envisaged new research paradigm for participatory and interdisciplinary geronto technological research gives potential users a corresponding opportunity to provide their ethical, social and legal ideas with regard to the future shaping of cooperation between man and technology throughout all phases of the development process.

In doing so, besides continuously including the target group, such a new research paradigm must also explicitly involve experts in a wide range of specialist domains. They comment on various aspects of the vision of the future that has been developed from their respective viewpoints and thus orient the discussion towards sustainable implementation.

3 Approach

A stable network and exchange platform with a long-term orientation was established in order to support the process of creating and establishing such a research paradigm for interdisciplinary research by the junior research group Tech4Age. The DenkfabrEthik (neologism from the German terms Denkfabrik (think tank) and Ethik (ethics)) was founded for this at RWTH Aachen University in 2015, and examples of its approaches and principles are presented below.

As a first step, it was necessary to develop the (regional) understanding of relevant cause-effect relationships and dependencies between man, technology and societal norms in an open discussion with experts from research and industry as well as a broad societal cross-section of citizens from various age groups (see Table 1).

Table 1. Objectives and self-image of Aachener DenkfabrEthik.

(1) We identify and discuss (regional) potential, challenges and obstacles that result from digitalization in practice
(2) We sensitize people to the ethical, social and legal implications of technical innovations
(3) We support a sustainable design of technical systems and organizations beyond age and organization borders
(4) We provide an independent exchange and networking platform, which includes people from all sectors and levels in our society
(5) We increase the decision-making power of individuals and organizations by consolidating various opinions and views into one interdisciplinary perspective
(6) Through participation, we develop (design) recommendations, decision-making aids and positions on practical issues concerning the interaction between man and machine

The exchange between the non-specialist public and experts is made possible, among other things, by keynote speeches, interactive workshops and demonstrators, 'fishbowl' discussion rounds, interviews, (long-term) studies, surveys, and also the possibility of giving one's opinion anonymously (see Fig. 1). In order to achieve the highest possible degree of inclusion here with regard to age, social status and cultural background, a wide variety of communication media is used to reach all (age) groups via their preferred channel (online, social media, daily newspaper, regional television, etc.).

The Aachen region is characterized by its technical and social science universities and universities of applied sciences. The general public can regularly gain practical experience with technical innovations by integrating and visiting numerous industry and research institutions on site, e.g. in the context of larger fringe events. First-hand experience with future technologies is supplemented, for in-stance, with test phases, in which the Aachener DenkfabrEthik makes it possible to try products in one's own home, including long-term.

The fact that views on technical integration depend heavily on the respective age is taken into account. Among other things the use of an age simulation suit for young people makes it possible to 'age' motor and perceptive skills by around 30 years within

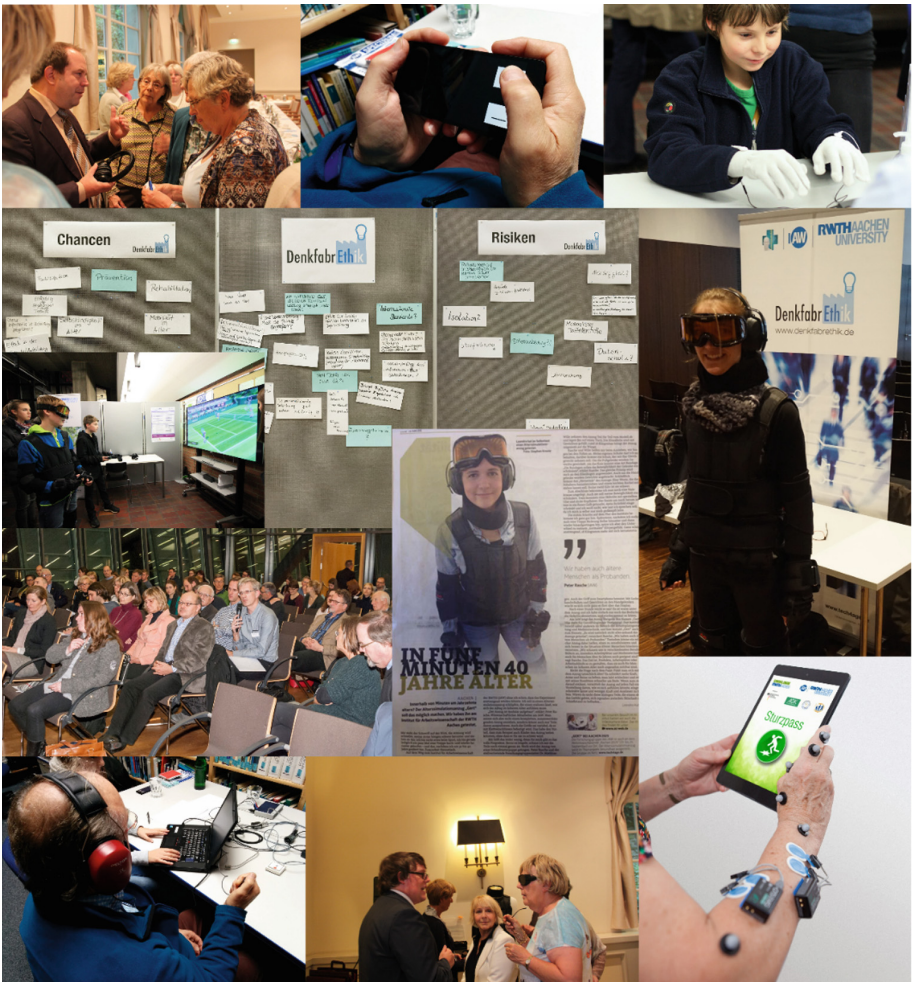

Fig. 1. Impressions from various events and formats of Aachener DenkfabrEthik

a few minutes and thus sensitize them to the needs of older people. At the same time, free lectures and workshops e.g. as part of university studies for senior citizens, offer interested older people the opportunity to familiarize themselves with products and services based on innovations in information and communication technologies and gain help in how to use them independently.

The cross-faculty, academic evaluation is undertaken using a multi-methodological approach in which procedures from various disciplines such as psychology, sociology, IT, engineering, economics and medicine are combined and transformed for use in new areas of application.

The interdisciplinary development and exchange of expertise in the envisioned new research paradigm is actively supported in that results are transferred into a generally

understandable lingua franca. This "language" can be understood and expanded by all the disciplines involved, making it tangible and applicable across technical, cultural and regional borders.

4 Conclusion

The Aachener DenkfabrEthik was founded as a network and exchange platform aiming to support the process of creating a new research paradigm for interdisciplinary research. In terms of a participatory approach, it is based on inclusion and the shared understanding of all the actors involved in all phases of development. Due to the correlation between age and the need for (technology-based) assistance and support functions to compensate for changes in ability, the viewpoints of older and very old people play a special role in developing sustainable solutions that are accepted by the target group and thus represent added value both for the individual and for society as a whole.

Through diverse opportunities and approaches for involvement through and at Aachener DenkfabrEthik, it is possible for the general, non-specialised public to communicate with experts at eye level and thus gain integrated knowledge above all of ethical, social and legal aspects in the age-differentiated design of technical systems. This process supported by the Aachener DenkfabrEthik results in an interdisciplinary research paradigm for participatory research in which technical innovations are designed in a user-centric manner, implemented across domains, and assessed on a macrosocial level.

Acknowledgments. A very special thanks goes to the members of the advisory board of Aachener DenkfabrEthik for their constructive collaboration.

This publication is part of the research project "TECH4AGE," financed by the Federal Ministry of Education and Research (BMBF, under Grant No. 16SV7111) and promoted by VDI/VDE Innovation + Technik GmbH.