First International Workshop on Co-Creation of Hybrid Interactive Systems for Healthcare

Alina Huldtgren
Hochschule Düsseldorf
Düsseldorf, Germany
alina.huldtgren@hs-duesseldorf.de

Holger Klapperich
Hochschule Düsseldorf
Düsseldorf, Germany
holger.klapperich@hs-duesseldorf.de

Tim Weiler
Universität Siegen
Siegen, Germany
tim.weiler@uni-siegen.de

David Struzek
Universität Siegen
Siegen, Germany
david.struzek@uni-siegen.de

Lone Malmborg
IT University of Copenhagen
Copenhagen, Denmark
malmborg@itu.dk

Mark Rouncefield
Universität Siegen
Siegen, Germany
m.rouncefield@lancaster.ac.uk

Gerhard Fischer
University of Colorado
Colorado, USA
gerhard@colorado.edu

Claudia Müller
Universität Siegen
Siegen, Germany
claudia.mueller@uni-siegen.de

ABSTRACT

This workshop focuses on developing a systematic approach for reflection of co-creation of hybrid interactive systems in healthcare, i.e. the combination of technology-enabled remote caring and in-person healthcare. The value of hybrid approaches in healthcare has become apparent, in particular, during the recent Covid-19 pandemic, but remains important post-covid, as hybrid modes of operation can mitigate other issues, e.g. remote healthcare delivery, or sustainable healthcare. The advancement of data science and artificial intelligence enables these hybrid modes of healthcare, but it also calls for integrated co-creative design approaches that bring together experts in AI, Socio-Informatics, UX and Ethics as well as citizens and practitioners. Despite a long-standing tradition of participatory approaches within HCI, an analysis of the literature shows that the label 'participatory' is used addressing many different levels of participation as well as diverse methods. A deeper analysis of the practice of inter- and transdisciplinary participatory research in the healthcare field is, however, missing. Furthermore, the aforementioned technological advancements bring new social, technical and ethical issues to the fore, among others questions of data bias, and empowerment of stakeholders. In this workshop we invite researchers and practitioners from diverse backgrounds to share their experiences and (design) case studies in co-creation of hybrid health systems and learn from contextualized best practices and failures. Through building on these experiences and cases and taking inspiration from praxeological research, we would like to collaborate towards a systematic approach for reflection in co-creation of hybrid healthcare systems.

Conference acronym 'XX, June 03–05, 2018, Woodstock, NY

ACM ISBN 978-1-4503-XXXX-X/18/06…$15.00
https://doi.org/XXXXXXX.XXXXXXX

CCS CONCEPTS

• **Human-centered computing** → **Human computer interaction (HCI)**; • **Applied Computing** → *Life and medical sciences.*

KEYWORDS

Co-Creation, Participatory design, healthcare, data science, artificial intelligence

ACM Reference Format:
Alina Huldtgren, Holger Klapperich, Tim Weiler, David Struzek, Lone Malmborg, Mark Rouncefield, Gerhard Fischer, and Claudia Müller. 2018. First International Workshop on Co-Creation of Hybrid Interactive Systems for Healthcare. In *Proceedings of Make sure to enter the correct conference title from your rights confirmation emai (Conference acronym 'XX)*. ACM, New York, NY, USA, 5 pages. https://doi.org/XXXXXXX.XXXXXXX

1 INTRODUCTION

The provision of healthcare in the digital age has been recognized as a wicked problem [10] affecting many stakeholders in diverse care settings and various levels of technological competences. Stimulated through the recent COVID 19- pandemic, the development of hybrid healthcare systems, i.e. a combination of analogue in-person sessions and digital services or tools for diagnosis, treatment and health management, has been accelerated. Today, our health and wellbeing is influenced highly by digital technologies in all phases of life [4]. Besides the immediate necessity during the pandemic, hybrid healthcare systems remain an important addition in today's technological landscape as they mitigate other problems like healthcare provision in rural areas and ecological sustainability [8], [13]. The advancements of tele-medical technologies that allow specialists to operate from a distance, data science that can provide new insights for diagnosis and disease progression prediction, artificial intelligence (AI) that allows to delegate parts of the caregiving to machines are, among others, important drivers for developing hybrid healthcare systems further. At the same critical voices raise concerns about the use of AI and automation in healthcare, about large companies dealing with sensitive user data, and the distrust

or dissatisfaction in political decision-making grows. In addition, questions around biases in datasets that may lead to disadvantaging certain user groups or generally the exclusion of digital services for user groups that have little digital competence arise. Taken as a whole, we posit, that these opportunities and challenges can only be well-addressed by a co-creation approach grounded in practice [17], that on the one hand brings together various scientific disciplines (e.g. computer science, data science, AI, human-computer interaction (HCI), socio-technical systems design, social sciences, ethics) and on the other hand involves practice and citizens (primary and secondary users).

Within HCI several schools of research (Participatory Design [12], Socio-Informatics [18], co-design/ co-creation [11]. and value sensitive design (VSD) [5]) argue for the involvement of potential users and other stakeholders in technology development and provide frameworks and methods to involve stakeholders throughout the design process. It is argued that the final products of such a process meet the users' needs [6], [17], and support quality of life and wellbeing. Despite the vast uptake of participatory approaches within HCI, there are ongoing debates about the concrete procedures and methods and around the way of how participation is being conceptualized and understood. Is it a method or is it a research attitude? Besides reflections on topics such as recruitment strategies [7] and power relations [3] , other discourses within HCI revolve around the notion of configuring participation [16] and how to reimagine participatory design [1] to fit it to the current socio-political context. As Bannon and colleagues (ibid) outlined, the uptake of participatory approaches to ICT design within HCI, and among it health-related HCI, has been immense in the last decades and a plethora of methods has been proposed and adapted from other disciplines. However, "(t)he introduction of these new methods has often come at such a speed that there is little opportunity for careful, systematic reflection on how they might relate to each other. Their differing epistemologies, underlying values, and concrete applications bring a richness in their diversity, but overlaps, gaps, and discrepancies among them are as yet not well understood." (ibid, p. 6). In addition, the authors observe a dilution of participation design, while researchers use the term in their publications without following the original values and principles of the approach. At the same time the ideals that each of the aforementioned approaches encapsulates, are hard to put into practice in real-world projects, and as Bannon et al., (ibid) state: "[…] there is a risk in that: We might move Participatory Design into an ideal realm that no one can achieve anymore." (p. 3).

On top of these general issues of participation, the area of hybrid healthcare systems development poses more specific challenges. For instance, there are risks involved in going out 'into the (healthcare) field' and into intensive collaborations with co-researchers (i.e. the patients, doctors, therapists etc.). Going into the wild, building up relationships with diverse people including vulnerable ones, facing the unexpected aspects that arise when dealing with disease and life-critical situations, having to deal with sensitive settings, questions of positionalities and ownership [9] [14] - all this brings special challenges that are reflected within participation research itself, but not yet intensively in HCI and even less in technological development practice. Some HCI researchers have called for more reflective practice [1], [2] regarding matters of transparency of recruitment [14], making voices of diverse stakeholders, including vulnerable ones, heard and also providing insights into the stances of the researchers, as the latter's role influences value co-creation and project results [20], [2] . In addition, organizers of this proposed workshop have experienced challenges around the transdisciplinary work between science and industry / public sector, and the requirements that funding programs dictate. These issues are rarely discussed in the academic literature, which focuses more on what worked well than what was challenging. Especially in health technology development, where many of the aforementioned issues arise and the required quality of products is high, a deeper reflection on how co-creation is configured and unfolds in the wild and systematic analysis thereof, beyond the commonly reported results, is crucial and the focus of this workshop.

2 WORKSHOP THEMES AND OBJECTIVES

While we encourage sharing of experiences that go beyond the following themes, these can serve as a starting point and inspiration:

- `configuring co-creation`: this theme aims to consider aspects of recruitment, motivations and meta-level perspectives on the co-creation process. Interesting questions around issues of power relations, transparency, reciprocity and roles of participants [6] are in the focus of the discussion.
- `enabling for co-creation`: within the given field, enabling for co-creation focuses on at least two aspects: (1) on making participation possible for people with special constraints, e.g. motoric, cognitive or expressive (e.g. speech problems) issues, and (2) on empowering participations to understand the socio-technical system under development. While less tech-savvy people may find it generally difficult to contribute and take design decisions, this issue is prevailent for many stakeholders when designing systems with advanced technologies such as VR, AR and AI.
- `dealing with vulnerability`: within the healthcare context, special care has to be taken of participants that are vulnerable, with vulnerability relating here e.g. to their health status and handicaps, risk of being abused, underage, etc. [9] enabling Issues around getting informed consent of these groups may be discussed as well as issues around inviting substitute stakeholders into the co-creation process.
- `case studies from the field`: as we want to ground our systematic approach in practice, we are putting special focus around collecting and learning from case studies from the field. We invite anything from anecdotes from the field to full case studies.
- `special aspects regarding the use of data science and AI`: the use of AI in general, and in particular machine learning techniques, poses new challenges on the co-creation of systems, as the outcome of intelligent algorithms and emergent systems is not always easy to foresee during the design process. How can this element of uncertainty be taking into consideration in the co-creation? And how can we co-design for interactions of human and non-human actors? are just two core questions.

2.1 Workshop Goal: Building ground for the collection, reflection and long-term set-up of a forum on challenges and failures in co-creation in hybrid health systems

To open up a space for systematizing debates around the particularities and challenges of participation and co-creation in hybrid healthcare systems development, this workshop aims at building up a forum for learning from both: best practices and from failures, pitfalls, awkward feelings and the like. Through the lens of a praxeological approach [19], focusing on case studies and practices within the socio-technical hybrid systems, we would like to work towards a systematic approach for reflection of co-creation in health technology development. We believe that the results can make an important contribution to mitigate the lack of reflective practice when it comes to reviewing and documenting participatory health technology development processes in the HCI literature. Furthermore, the workshop provides a networking space for researchers and practitioners in the field.

3 WORKSHOP PLANNING

The workshop is divided into 3 parts (see time planning in Table 1): (1) getting to know each other and each other's work, (2) working out visions and blind spots, and (3) discussion around community building and steps towards a shared reflective practice. After the introduction and presentation of the agenda by the organizers, the participants present their case studies briefly, not exceeding 5 minutes. It should be made clear what challenges the participants encountered during their participatory work, how these were overcome, what lessons were learned, and whether new opportunities arose as a result. Additionally, participants are asked to describe their vision of co-creation in hybrid healthcare system development briefly. Visions are collected on a Miro-Board (see Fig. 1), which is divided into two parts: in the top area visions are collected, in form of one or two sentences and additional three hashtags. Similar to the method of "concept-mapping" [15] the visions of each workshop-participant will be deconstructed through copying the single hashtags and paste them into an appropriate challenge box. By doing so the different challenges get enriched with subtopics based on the visions but also areas where no subtopics (hashtags) were collected are highlighted. In a group discussion those emerging "blind spots" will be discussed, leading to new visions. Below six colored boxes represent the main challenges identified in the participatory healthcare literature so far: 1. Recruitment, 2. Enabling, 3. Motivation, 4. Vulnerability, 5. Reciprocity, 6. Reflection (more to be added or refined based on input of participants, in particular in AI-based and hybrid systems). The described visions might address different areas in the co-creation process and the three hashtags identify main concerns. After the lunchbreak, the third phase of the workshop is initiated. Here, the focus lies on working in break-out groups (5-8 people) on different aspects that will lead towards the workshop goal of defining a sustainable way of working with (i.e. learning from and documenting) the cases studies to build a reflective practice community. Each group first deals with single themes around questions of how to achieve reflective practice, how to document cases, how to analyze them systematically and how to share learnings with the community. Groups will be provided materials

Table 1: Preliminary Workshop Schedule

Time	Activity
09:00 – 09:15	Brief workshop introduction
09:15 – 10:30	Attendees' presentations
10:30 – 10:45	Break
10:45 – 12:15	Concept mapping: Visions of participation
12:15 – 13:45	Lunch Break
13:45 – 15:15	Group discussions towards workshop go
15:15 – 15:30	Break
15:30 – 16:30	Presentation and discussion of results from groups
16.30 – 17:00	Final discussion of next steps and wrap-up

to create a poster on their brainstorming and discussion. In case we have remote participants, we will use the Miro Board. Finally, the results from each group will be presented and discussed in the plenum. At the end of the day there is time to reflect on the day and to consider how the results can be published and how the community would like to continue collaborating after the workshop, e.g. using website and social media options. An optional shared dinner will allow for more informal getting together.

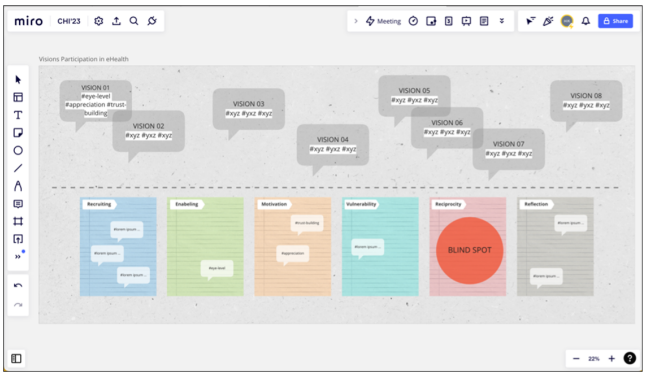

Figure 1: Miro-Board "Visions of Participation in hybrid intelligent healthcare technologies "

4 TARGET AUDIENCE AND RECRUITING

We envision an inter- or even transdisciplinary workshop involving diverse stakeholders in the field of hybrid interaction systems for healthcare. This may involve researchers from HCI, socio-informatics, CSCW, Data Science, AI, Software Development, and Ethics. We invite also technology developers, UX designers, healthcare practitioners to join with their stories from the field. As a majority of the organizers of this workshop are partners in the CoCreHIT consortium (https://cocre-hit.de/), we would like to invite also representatives of projects funded within the same research program on 'Hybrid interaction systems for maintaining health even in exceptional situations"' (https://www.interaktive-technologien.de/foerderung/bekanntmachungen/his).

Basic information regarding the workshop will be published online. The website (https://cocre-hit.de/muc23workshop/) serves as

an inspiration and invitation for authors to participate and includes a description of the workshop, the background, submission details, important dates, information about the organizers, the workshop schedule including activities and details about the attendees as soon as they are accepted. We will also integrate the Call for Papers (CfP) into the website. An English version of the site will be publicly communicated among other details by sending the CfP to mailing lists relevant for our purposes. We will include the ACM, CHI, and E/CSCW communities, as well as networks in topic-specific areas such as healthcare and participatory research. Additionally, the workshop will be communicated to the collaborative projects the above named funding program. This will allow greater cooperation between the projects and ensure a high level of interest in the workshop. Submissions are archived on the website and in the conference proceedings to guarantee sustainability. Furthermore, the body of knowledge will be continuously extended with case studies from projects of the funding program mentioned above and other interested researchers, building a community with the help of social media and fostering interaction after the workshop. To participate in the workshop, interested parties must submit a position paper providing a case study, which in turn must be accepted. A workshop position paper must be prepared according to the ACM Master Article Submission Templates (single column). It must be submitted via e-mail to cocreative-ehealth@gmail.com as a single PDF file. The proposal must be no more than 5 pages (including references). Submissions will be reviewed by the Organizer Committee for originality, quality and relevance. Accepted submissions will be published on the workshop website before the workshop and will thereby serve as an introduction to the discussions during the workshop.

ACKNOWLEDGMENTS

This research is funded by the German Federal Ministry of Education and Research under grant number XXX.

REFERENCES

[1] Liam Bannon, Jeffrey Bardzell, and Susanne Bødker. 2018. Reimagining participatory design. *Interactions* 26, 1 (2018), 26–32.
[2] Alan Borning and Michael Muller. 2012. Next steps for value sensitive design. In *Proceedings of the SIGCHI conference on human factors in computing systems*. 1125–1134.
[3] Tone Bratteteig and Ina Wagner. 2016. Disentangling participation: power and decision-making in participatory design.
[4] Christoph Dockweiler and Florian Fischer. 2019. ePublic Health: Vorwort zur Erschließung eines neuen Forschungs-und Anwendungsfeldes. *ePublic Health. Einführung in ein neues Forschungs-und Anwendungsfeld* 1 (2019), 15–19.
[5] Batya Friedman, Peter H. Kahn, Alan Borning, and Alina Huldtgren. 2013. *Value Sensitive Design and Information Systems*. Springer Netherlands, Dordrecht, 55–95. https://doi.org/10.1007/978-94-007-7844-3_4
[6] Alina Huldtgren, Holger Klapperich, and Cordula Endter. 2022. Next Steps for User Integration in ICT for Aging Well.. In *ICT4AWE*. 291–298.
[7] Sebastian Merkel and Alexander Kucharski. 2019. Participatory design in gerontechnology: A systematic literature review. *The Gerontologist* 59, 1 (2019), e16–e25.
[8] Johanna Meurer, Claudia Müller, Carla Simone, Ina Wagner, and Volker Wulf. 2018. Designing for sustainability: Key issues of ICT projects for ageing at home. *Computer Supported Cooperative Work (CSCW)* 27 (2018), 495–537.
[9] Stephanie R Montesanti, Julia Abelson, John N Lavis, and James R Dunn. 2017. Enabling the participation of marginalized populations: case studies from a health service organization in Ontario, Canada. *Health promotion international* 32, 4 (2017), 636–649.
[10] Horst W Rittel and Melvin M Webber. 1974. Wicked problems. *Man-made Futures* 26, 1 (1974), 272–280.
[11] Elizabeth B-N Sanders and Pieter Jan Stappers. 2008. Co-creation and the new landscapes of design. *Co-design* 4, 1 (2008), 5–18.
[12] Douglas Schuler and Aki Namioka. 1993. *Participatory design: Principles and practices*. CRC Press.
[13] Carla Simone, Ina Wagner, Claudia Müller, Anne Weibert, and Volker Wulf. 2022. *Future-Proofing: Making practice-based IT design sustainable*. Oxford University Press.
[14] Gillian Symon and Chris Clegg. 2005. Constructing identity and participation during technological change. *Human Relations* 58, 9 (2005), 1141–1166.
[15] William M Trochim and Daniel McLinden. 2017. Introduction to a special issue on concept mapping. *Evaluation and program planning* 60 (2017), 166–175.
[16] John Vines, Rachel Clarke, Peter Wright, John McCarthy, and Patrick Olivier. 2013. Configuring participation: on how we involve people in design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 429–438.
[17] Volker Wulf, Claudia Müller, Volkmar Pipek, David Randall, Markus Rohde, and Gunnar Stevens. 2015. Practice-based computing: Empirically grounded conceptualizations derived from design case studies. *Designing socially embedded technologies in the real-world* (2015), 111–150.
[18] Volker Wulf, Volkmar Pipek, David Randall, Markus Rohde, Kjeld Schmidt, and Gunnar Stevens. 2018. *Socio-informatics*. Oxford University Press.
[19] Volker Wulf, Anne Weibert, Konstantin Aal, Sarah Rüller, Markus Rohde, et al. 2021. The Praxeological Research Programme of Socio-Informatics–the Siegen School. *Acta Informatica Pragensia* 10, 3 (2021), 333–348.
[20] Daisy Yoo, Anya Ernest, Sofia Serholt, Eva Eriksson, and Peter Dalsgaard. 2019. Service design in HCI research: the extended value co-creation model. In *Proceedings of the Halfway to the Future Symposium 2019*. 1–8.

A WORKSHOP ORGANIZERS

Alina Huldtgren is Professor of Digital Health and Intelligent User Interfaces at Düsseldorf University of Applied Sciences. She holds a PhD in HCI and runs a co-design lab for digital health (www.codeforhealth.de). Her research focuses on issues around and methods for enabling diverse stakeholder groups, among others vulnerable groups (e.g. people with dementia, children), in digital health development. She is PI in a project on engagement of older citizens, and partnering CoCre-HIT (cocre-hit.de), an ongoing project on co-creation in hybrid healthcare systems development.

Holger Klapperich works as a post-doctoral researcher at the Faculty of Media at Düsseldorf University of Applied Sciences. He holds a PhD on the topic of "The compatibility of efficiency and well-being" and researches well-being-oriented design of digital technology in the eHealth sector. He led the funded project "NoStress" in the working group "Experience and Interaction" (Prof. Hassenzahl) and the EFRE-funded research project "Design for Wellbeing.NRW".

Tim Weiler is a research associate at the University of Siegen, Germany. His research focuses on PD and Co-Creation in healthcare. Hybrid interaction systems for maintaining health even in exceptional situations are analysed and a framework for co-creative methods is to be defined.

David Struzek is a PhD student at the Chair of Information Systems, especially IT for the Ageing Society at the University of Siegen. He researches how people in urban public spaces can be supported in their physical movement and health by technical interactive systems and in rural areas by hybrid systems. He is also interested in designing good usability and UX using creative methods.

Lone Malmborg is an Associate Professor and Head of Digital Design Department at the IT University of Copenhagen. She holds a PhD in Computer Science / Informatics. Her latest research explores how co-design, interaction design and social innovation can change the research agenda in design and ageing, and more specifically design related to social aspects of ageing. 2014 to 2017 she was

the scientific coordinator of the EU project Give&Take – Designing a reciprocal exchange service for a good and engaged senior life. She co-edited Digital Creativity 1998-2015. Further, she was an appointed member of the Danish Disability Council 2011-2015 working for an inclusion and participation agenda.

Mark Rouncefield is a Senior Professor at the University of Siegen. Previously he was a Reader in Social Informatics in the School of Computing and Communications, Lancaster University. His research interests are in CSCW and HCI and involve the study of various aspects of the empirical study of work, organisation, human factors and interactive computer systems design, working across traditional disciplinary boundaries to address challenging socio-technical problems. He was awarded a Microsoft European Research Fellowship for his work on social interaction and mundane technologies (2006-08). He authored several books, e.g. Configuring user-designer relations: Interdisciplinary perspectives (2009); Doing Design Ethnography (2012). Recent research, in collaboration with Rob Procter of Warwick University, has focused on understanding aspects of professional detection and diagnosis in healthcare as a precursor to the design and evaluation of AI technologies.

Gerhard Fischer is Professor Emeritus and Professor Adjunct of Computer Science, a Fellow of the Institute of Cognitive Science, and the Director of the Center for Lifelong Learning and Design (L3D) at the University of Colorado at Boulder. He is a member of the Computer Human Interaction Academy, a Fellow of the Association for Computing Machinery, and a recipient of the RIGO Award of ACM-SIGDOC. In 2015, he was awarded an honorary doctorate from the University of Gothenburg, Sweden. His research has focused on new conceptual frameworks and new media for learning, working, and collaborating, human-centered computing, assistive technologies, and design. His recent work is centered on quality of life in the digital age, social creativity, meta-design, co-creation, cultures of participation, and design trade-offs.

Claudia Müller is an Assistant Professor of Socio- Informatics, specialising in "IT for the ageing society" at the University of Siegen, Germany. Her expertise is PD with and for older adults, vulnerable user groups and local communities. She is representative chairwoman of the commission of the Eighth Federal Government Report on Older People.

Received 14 March 2023; revised ; accepted