

Transdisciplinary and Participatory Research for Robotic Care Technology - Mapping Challenges and Perspectives

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Abstract—The project *Caring Robots // Robotic Care* is a transdisciplinary research collaboration between scientific disciplines and practice partners to engage in participatory design processes for (robotic) care technology. As transdisciplinary work presents not only opportunities for new solutions, but also challenges when it comes to finding a shared language, bridging disciplinary boundaries and respecting perspectives of stakeholders, we conducted an exercise of documenting interpretations of PhD and master students with different disciplinary backgrounds regarding care, project success and challenges we experience or expect to encounter. In this short paper, we summarize the key themes that came up and complement them with the perspective of a representative of the care institution that is our research partner (Caritas Wien).

I. INTRODUCTION

There is an increasing recognition that projects that aim to design robotic solutions for the ‘real world’ require a multi-stakeholder approach and integration of different disciplinary competencies. This is especially pertinent for domains such as healthcare, where applications must not only meet the requirements of being technically robust and reliable, but also of being socially and culturally integrated, ethical, and desired by the key stakeholders. Transdisciplinary research involves collaboration between different disciplines to solve complex societal problems in real-world contexts [1], [2]. While transdisciplinary collaboration presents exciting opportunities, it poses challenges related to bridging different epistemic cultures [3] and formation of a shared language.

The *Caring Robots // Robotic Care* project is a transdisciplinary research collaboration on the topic of care technology hosted by two Austrian universities (TU Wien, University of Salzburg), an organization providing care and social services in Vienna (Caritas Wien) that we consider a research partner, and the Vienna Museum of Science and Technology (Technisches Museum Wien). The project aim is to re-imagine roles for robotic technology through participatory design processes involving stakeholders in the care context.

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As a multi-disciplinary team, we aim to enable a process of mutual exchange between care providers, care recipients, the broader public, and technology developers, to develop useful, safe, meaningful and *wanted* technology.

As our project is in the starting phase, we took this workshop position paper as an opportunity to articulate how the involved PhD and master students approach care from the perspective of their respective disciplines, how they define success and, importantly, what their fears and doubts are concerning collaborative work. In our view, mapping and reflecting on our disciplinary assumptions and how these shape our expectations is an important first step in crossing disciplinary boundaries and engaging with complex ‘matters of care’ [4] through creative synergy. The backgrounds of the students involved in the research work are in Science and Technology Studies (STS), sociology, Human-Robot Interaction (HRI), Human-Computer Interaction, participatory design (PD), computer vision, and electrical and mechanical engineering. In what follows, we outline the key themes that emerged and extend these with responses of a representative of partner care institution Caritas Wien, who has a background in nursing science. We conclude with several open questions that we would like to address during the workshop.

II. CHALLENGES AND OPPORTUNITIES

As PhD students in this project, we asked ourselves what a successful project outcome would be according to us, as well as what our concerns are regarding the process of transdisciplinary collaboration. We did a thematic analysis of these individual accounts and discussed definitions of care, the role of technology in care and expectations with respect to project outcomes with Carina Brauneis (CB), a representative of project partner Caritas. Our view of project success includes: (1) developing a deeper understanding of care (and the desired and undesired roles of technology in care), (2) developing novel approaches to participatory technology design that integrate insights from multiple disciplinary perspectives and stakeholders, (3) prototyping technological solutions as informed by (1) and (2). In what follows, we expand on each of these components and outline potential challenges.

1) *Understanding Care*: Care, as suggested by [4], does not have one-fits-all interpretation. Rather, it is materially, socially, culturally, and also politically situated. One of the common themes that emerged in the individual accounts regarding deeper understanding of care concerned exploring

how different stakeholders, in different positions of power, and with different backgrounds, understand and experience care. For us, the goal of understanding also includes mapping (un)desirable roles of technology in care practice. An important theme that was mentioned by several researchers was care from the perspective of labor and the necessity to understand which risks (e.g. increased burden on care workers) may come up with the introduction of new technologies and how to mitigate them. Recognizing and respecting the labor of the care workers also means that we must seek to ensure that the participation in the project in itself is experienced as something worthwhile and not as straining or stress-inducing. Deep engagement with multiple perspectives on care and experiences of enacting care also calls for a particular *care enacted at the level of research practices*, including care for research ethics (e.g. informed consent). Such care means reflexivity regarding the way we narrate and construe our participants, e.g. avoiding stereotypes and falling into the trap of representing our participants as a homogeneous group of “vulnerable” and frail people in need of “fixing”, a common narrative in HRI expert discourses [5]. Another aspect of care as enacted in a research process is reflecting on what our participants stand to gain from their participation: what makes it useful and valuable for them?

In our conversation with CB, she emphasized how crucial it is to respect care workers and care recipients and their individual voices as valuable contributions to the project of designing better technologies for people. CB also highlighted the complexity of the professional care practice. Care work requires theoretical knowledge (i.e. medical knowledge), practical knowledge (i.e. knowledge how to conduct medical procedures or how to administer care, such as lifting or feeding), and social skills, including knowledge regarding how to communicate with relatives of care recipients and establishing boundaries between one’s professional and personal life. Certified nurses must also have bureaucratic and financial knowledge, e.g. relating to the implications of different care levels according to the Austrian system.

In the conversation with CB, time and temporal aspect of care came up in different contexts, as did the importance of *taking time* as a form of respect. First of all, providing care takes time, and more complex care provision requires more time and more training. Training and skill development of care workers takes time, as does getting accustomed to the use of new technologies that are introduced into their practice - time that is not always available. Taking time is also required to get to know care recipients who are not always open or able to communicate their needs at the onset. This is one approach researchers can take: respecting the people they work with by really taking the time to get to know their needs. Time was also mentioned as one of the constraints that care institutions must overcome when they are to fulfill external requirements from the local/state government (e.g. concerning data protection). Last but not least, time is a relevant factor in the process of decision-making regarding acquiring new technologies and development of technologies that need to interface with existing infrastructures. Taken

together, these different temporalities of care invite the question regarding how to respect and balance them within the time frame of a research project.

2) *Developing Processes*: This brings us to the second component of success; developing processes for transdisciplinary research and participatory design. Students with a PD background emphasized the importance of respecting the core commitments of PD: to empower stakeholders to co-shape their socio-technical futures, foster emancipation through mutual learning, and recognize participants’ voices as equal throughout all stages of the project [6]. The development of processes occurs both with research participants (PD) but also within the research team (transdisciplinary research). Importantly, taking on a participatory stance means that problems and solutions must be construed in more than just technological terms, which is both a challenge and an opportunity. The risk of “technological solutionism” at expense of addressing the complex socio-technical and economical challenges of care was mentioned by several of us. Despite the risks, the students with engineering backgrounds embraced the challenge and the opportunity to develop and deploy robotic technologies that operate in unconstrained environments over longer period of time.

3) *Prototyping Technologies*: With respect to prototyping and evaluating technological solutions in real world environments, we identified multiple challenges. The biggest challenge concerned how to navigate through the participatory design process taking into account the different inter- and transdisciplinary interests, mainly when translating the needs of the different stakeholders (caregivers, care receivers, etc.) into feasible technological solutions, while managing expectations of what the technology is capable of. As with the risk of technological solutionism, there is a risk here that involves instrumentalization of empirical results to justify certain technologies, as well as to hinder technology development due to different stakeholders’ concerns. Other challenges included the requirement of sufficient robustness that must be ensured for such technologies to be integrated sustainably. Another challenge that was identified was the issue of potential mistrust in technology by care workers and care receivers. CB noted that their participation from the beginning of the project and asking them about their ideas and visions has the potential to reduce this mistrust, as well as to kickstart a profound societal discussion of the future for technology and care, which would constitute project success.

III. OPEN QUESTIONS

- How to reconcile different temporalities? Research work has timelines that may not match taking the time to find out what people actually want and need.
- How do we translate findings from fieldwork into concrete designs? What happens when societal problems are translated to research problems? How to make choices when faced with opposing disciplinary/stakeholder interests, or situations that require decisions involving trade-offs between technological possibilities and values such as privacy?

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