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Three challenges in practicing Research through Design in the context of PhD design research

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Abstract: Research through Design (RtD) is a maturing research methodology in Design and Human-Computer Interaction (HCI), in which design actions are used as a means to conduct research. This way of doing research holds promise for creating transdisciplinary results but it comes with challenges. Research and design are similar in that both aim to create something new. However, depending on a project’s context, there may be different expectations about what that something new is, spanning from generalized knowledge to localized solutions. In this paper we discuss two PhD projects in the healthcare sector and reflect on three challenges encountered by the PhD researchers: (1) navigating the dual aim of designing interventions and generating academic knowledge, (2) balancing the creation of prototypes as products for use and objects of inquiry, and (3) effectively collaborating with stakeholders in complex and sensitive settings.

Keywords: Research through Design; multistakeholder collaboration; design interventions, complex and sensitive settings

1. Introduction

Research through Design (RtD) is maturing as a research methodology that involves doing design as part of doing research. Historically in Design and the Arts and later in Engineering and Human-Computer Interaction (HCI), there was a need to engage with design not just as a means to produce (local) solutions, but also to generate knowledge generalized beyond particular design instances. Over the last two decades, the number of design projects framed in this way has grown steadily. In this paper we focus on design research projects that explicitly aim to serve both objectives: create a particular social impact while also generating knowledge that is relevant to a broader community of academics and practitioners. We present two PhD projects and bring forward some of the challenges that emerged when



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combining research and design. We identify these challenges and discuss possible strategies to deal with them with the aim of furthering knowledge on RtD as a research methodology.

RtD has come a long way already. In 1979, Archer advocated for Design as a discipline, positioning it alongside the humanities and natural sciences, emphasizing the creation of knowledge through design sensibilities and inventiveness. Some ten years later, Frayling (1993) introduced 'research through art and design', underlining the involvement of research in material exploration, developing novel applications, and documenting design processes. In 2001, Buchanan made a significant contribution to RtD by categorizing design knowledge from specific to universal, discussing its application in individual design cases, generalizable design problems, and fundamental principles. Since then, RtD has diversified through ongoing discussions about its foundations (Gaver, 2012; Jonas, 2015) and the evolving types of RtD (Koskinen et al., 2011). Furthermore, RtD has entered fields outside the scope of Design, including HCI, in which the publication by Zimmerman et al. (2007) has been influential, and with newer connections in landscape architecture (Lenzholzer et al, 2013) and educational sciences (Reinmann, 2020). Other recent contributions on RtD focus on developing design theory within programmatic content based on series of design projects (Redström, 2017) and the impact of data technologies on the nature and role of artifacts in design research (Giaccardi, 2019).

In a review of cases and literature, Stappers and Giaccardi (2017) discuss key concerns in RtD emerging through the years: its methodology and process, the types of knowledge it yields, the function of designed prototypes, and methods of disseminating research findings to academic and professional audiences. They reflect on Koskinen et al.'s (2011) distinction between three types of RtD, each characterized by different approaches to conducting research and sharing outcomes: 'lab', 'showroom', and 'field'. In 'lab' RtD, studies are typically conducted in controlled settings and disseminated through formal channels such as academic articles. The 'showroom' format involves presenting prototypes along with their framing and annotations at exhibitions or similar events. In 'field' RtD, insights are gathered and shared with stakeholders through participatory or action research methods. Reflecting on these advancements, Stappers and Giaccardi further discuss how much of the existing theory has been influenced by relatively long PhD trajectories that provide ample opportunities for methodological reflection, making them interesting cases for investigating how RtD across these different types can be effectively carried out.

In this paper, we extend the discussion on RtD that is conducted in the context of PhD research to help foster its growth within the academic design discipline. We build on two PhD projects that focused on developing design solutions to support children with cancer and their families during treatment in the hospital and at home. Both projects fit the 'field' type RtD as defined by Koskinen et al. (2011), as they involved the making of prototypes that embody research questions about the interactions and experiences they elicit and testing them out in real-world settings. This healthcare context involves a vulnerable target group, strict medical and ethical regulations, various stakeholders, and multiple disciplines. Such a context presents many challenges that these PhD researchers had to deal with. In this paper, we

discuss three challenges that drew our attention as points of learning. They concern the aim of the researcher to design interventions and produce academic knowledge, to make prototypes as products for use and as objects of inquiry, and lastly, to manage the collaboration with stakeholders in a complex and sensitive setting. For each challenge, we discuss the issues and strategies to help to tackle it and ground this discussion in the related literature.

2. Two PhD projects

In 2014, a unique collaboration between the Princess Máxima Center for Pediatric Oncology, HandicapNL and the Faculty of Industrial Design Engineering at Delft University of Technology started. At the core of the collaboration were two PhD research projects, funded by the Dutch national charity 'de Vriendenloterij'. The foundation for this collaboration was a shared belief in the potential of combining the fields of design and healthcare to improve the quality of care and cure. More specifically, the aim of the collaboration was to create design solutions that allow children with cancer to be supported in their overall development and growth, in the hospital and at home. At the onset of this research project, the new building for the Princess Máxima Center was planned, and during project time this had been built, which provided a unique and solution-oriented context for the research. The reflections on the challenges in this collaborative research project are based on the first-hand experiences of four members of the research team from the Faculty of Industrial Design Engineering. Each author brings in a different perspective; the first author as project leader and advisor, the second author as one of the two PhD researchers, and the third and fourth authors as advisors.

For their new care program, the Princess Máxima Center proposed 'Development-Oriented Care' as a participatory approach to care that focuses on safeguarding the development of the child, for whom cancer and cancer treatment may cause threats to their development and growth (Aarsem et al., 2012; Tenniglo et al., 2017). The center expressed an interest to explore how (interactive) objects and environments could be integrated in such a development-oriented care approach. HandicapNL (an organization that aims to empower people with a handicap and/or chronic illness) showed interest to understand how such learnings could be translated to approaches for children with other chronic illnesses as well, which might also impact their development. The faculty of Industrial Design Engineering at TU Delft expressed a methodological interest and was keen to explore how an RtD approach spurred on the development of concrete design proposals that could make a difference in children's recovery and growth while also producing design knowledge to support design researchers and practitioners in the creation of healthcare innovations.

The PhD project of Boudewijn Boon (2020) focused on supporting young children's physical development while they were in the hospital. The physical development of children with cancer can be hampered due to the disease and treatment as well as by the low levels of physical activity during frequent hospital visits and sometimes long periods of hospitalization. Approaches to promoting these children's physical activity, are often exercise-based, involving prescribed, repetitive movements and exercises. Boon moved into an alternative

direction, based on the fact that young children have difficulties following rules and structured exercises – instead, young children tend to be physically active in the form of spontaneous and unstructured play. He took inspiration from outdoor play, which often takes on such a spontaneous form, and explored how to make this kind of play possible inside hospital environments. This idea became central to the development of a design perspective that he titled 'Playscapes'. Playscapes proposes that three play qualities are key when aiming to promote young children's physical activity and play: bodily play, free play, and dispersed play (Boon et al. 2016). Two design solutions were developed that instantiate the Playscapes perspective and were used as interventions in a pediatric hospital with the aim to generate design strategies (Boon et al., 2020). The first design, "Stickz", consisted of collection of large ambiguously shaped artificial branches, which allow children to creatively build different constructions in hospital waiting areas. The second design, "Fizzy", was a robotic ball that activates children in their patient room by triggering them to respond to a variety of movements and behaviors. This led to a variety of play and games, carried out alone or together with their parents (see Figure 1).



Figure 1 Photo's showing four designs developed in the two PhD projects: Fizzy (top-left), Stickz (top-right), Mr.V (bottom-left) and AscoltaMe (bottom-right).

The PhD project of Patrizia D'Oliveo (2021) focused on supporting children's psychosocial development by helping children and their families to continue a normal family life, while in treatment. With the onset of childhood cancer, normal family life becomes disrupted due to frequent hospital visits and worries about the child's health and survival. Everyday routines

like going to school, doing sports, and enjoying dinner together are difficult to maintain. Siblings may feel neglected because of the parents' attention on the ill child, and the parent's relationship can be under stress. To positively affect the wellbeing and resilience of the ill child during treatment, it is important to focus on the family as a whole by strengthening family cohesion, social interaction, and relaxation (Bronfenbrenner and Ceci 1994; Santos et al. 2015). During the long and intensive treatment, the child spends most of the time at home if conditions allow for it. Therefore, two interactive artefacts were created to be used and tested in families' homes (see Figure 1). "AscoltaMe" (Italian for "Listen to me"), is an interactive object resembling a tin-can telephone that can record and play voice messages to seduce family members to talk about emotionally sensitive topics (D'Olivo et al., 2017). "Mr.V" (short for "Mr. Verrassing", which translates to "Mr. Surprise" in English) is a surprise dispensing machine with human-like qualities, designed to stimulate quality time, by helping families think about leisurely activities they would like to do together and reminding them to do so in a playful way (D'Olivo et al., 2020a; 2020b). During the RtD process, the notion of 'Tactful Objects' crystallized as a design perspective on interactive artifacts that empower people in sensitive settings. This perspective includes a set of principles guiding designers in how partnerships between objects and people can be established by paying attention to the objects' character, the collaborations they afford, and the way they become embedded in social settings (D'Olivo, 2021).

Both projects were explorative, seeking an understanding of the phenomenon grounded in multiple disciplinary perspectives (e.g., oncology, pedagogy, social work, physiotherapy, psychology, engineering, design), but not reduced to any of them. This appeals to a RtD practice that calls for multiple disciplines to interact without any single discipline dominating the discussion. Accordingly, the methods employed here were aimed to coherently describe real-world phenomena and develop plausible interventions for it, rather than testing (mono-disciplinary) theory-led hypotheses. The employed techniques combined generative, qualitative, and observational research methods, focusing on exploring the experience and effects of deploying their designs in real-world settings. Both PhD researchers utilized prototyping to create standalone functional artifacts or props for speculative (wizard of oz) setups. The impacts of these designs were assessed through semi-structured interviews, questionnaires, and direct observation of human behavior, with or without the use of coding schemes. More details regarding the methods employed in each project and the underlying theories can be found in the theses of Boon (2020) and D'Olivo (2021).

2.1 Designing interventions and producing academic knowledge

The first challenge for the PhD researcher that we like to discuss lies in reconciling the dual aim of creating a design intervention and producing academic knowledge, which can be understood as direct-impact solutions and indirect-impact knowledge generated during the RtD process (Stappers and Giaccardi, 2017). By being the 'designer' (in a 'field' type RtD project, as described previously), the researcher aims to create a solution to a particular problem (i.e., the design intervention), which involves understanding a specific context and

developing ways in which that context may be improved by introducing the design. The designer needs to be sensitive to the particulars of the project, meaning that the focus is on people in real-world situations for whom a specific solution is beneficial. Design skills are one of the foundations of the PhD researcher doing RtD, supported by established methods such as the basic design cycle (Roozenburg and Eekels, 1995) and techniques for doing field research (e.g., Sanders and Stappers, 2012). This includes understanding the target group and context, framing problematic situations, envisioning possible means of intervention, creating prototypes, and evaluating them in the field.

By being the 'academic', the PhD researcher generalizes beyond the situation at hand. The designerly mindset needs to be balanced with an academic one in RtD that is oriented towards making novel knowledge contributions to academic communities. Here, the PhD researcher is not focused on understanding the particularities of the design intervention itself but how learnings gained during this process can be generalized as novel contributions to the field of Design and beyond. Balancing these two kinds of concerns, echo Findeli's (2010) separation of design questions and research questions. He argues that transforming design questions into research questions is a matter of construction, concerned with developing an understanding of a particular phenomenon as being grounded within a design project.

Adopting such a broader focus sets RtD apart from Research for Design (RfD). In the former, the aim is to acquire generalizable knowledge, while in the latter, the focus is primarily on acquiring knowledge to address the unique needs of a particular design intervention. For example, the project by Boon made an academic contribution by providing insights about how the ambiguity in the appearance and behavior of playthings can lead to play that is free, bodily, and dispersed, as defined in his framework, and by offering an alternative to existing exercise-based approaches in physiotherapy and interaction design (Boon et al., 2016; Boon, 2020). D'Olivo's work made an academic contribution by discussing how designing for sensitive settings requires a tactful approach, how tactfulness can be expressed in interactive artefacts, and by demonstrating how RtD can spur on innovation in the field of psychosocial cancer care (D'Olivo, 2021).

Thus, the direction in which the RtD processes unfolded in both PhD projects was driven by two, sometimes competing, interests: what the researcher had found to be problematic in the current situation regarding possible solutions (i.e., promoting children's physical activity or promoting communication and quality time in the family) versus what contributes to the academic discourse in the fields of design and healthcare, which could present two orthogonal lines of inquiry. The PhD researcher had to continuously shift back and forth between an eye for 'application' and an eye for 'generalization' (Stokes, 1997). This brought pressures on how to allocate time to understand the problems that people face, to envision and create designs, and how to combine this with absorbing the adjacent relevant disciplinary knowledge to identify knowledge gaps for making scientific contributions. Working closely with the project collaborators, who are members of the adjacent academic communities described earlier, proved helpful to navigate the knowledge domain and to identify these gaps.

Still, the PhD researchers were tasked with how to make an academic contribution in design, which encompassed these disciplinary perspectives.

Both orientations ('academic' and 'designerly') could be served by the notion of 'intermediate-level knowledge' (Höök and Löwgren, 2012; Höök et al., 2015), which provides a conceptual bridge, halfway between theory and artefact. This connects the outcomes of a RtD project as particular design manifestations with knowledge that can be generalized, transferred, and shared, with different academic disciplines. For instance, 'design perspectives', 'concepts', 'principles', 'guidelines', and 'mechanisms' reside at such an intermediate space between theory and artefact. Playscapes and Tactful Objects are considered as forms of intermediate-level knowledge: as design perspectives they engendered the making of practical design solutions, applicable across different use contexts, in ways that are interesting and novel conceptually. Creating such intermediate-level knowledge entailed exploring theory in relation to design problems and opportunities to discover interesting synergies, similar to the process described by Findeli (2010) when constructing research questions within a design project.

For instance, we noticed how finding particular theories helped us envision solutions to real-world problems in both practical and interesting new ways. Playscapes—informed by theories on play, child development and environmental design—provided a useful perspective for looking at how play can be given shape in hospital settings in ways that are suitable and beneficial for young patients. This combination of theories also contributed to 'behavioral design' by suggesting how to create opportunities for behavior change in which ambiguity was found to be a resource for pursuing particular behavioral outcomes rather than something to be avoided (Boon et al., 2018). The process of arriving at intermediate-level knowledge required fitting together ideas at different levels of abstraction, and from different disciplines, which is not straightforward and demands conceptual and transversal ways of thinking.

2.2 Making prototypes as products for use and objects of inquiry

The second challenge involves balancing the making of prototypes as products for use and as objects of inquiry, which can be considered a consequence of the first challenge on the practice of 'making' in the RtD process. This tension of achieving dual outcomes (both product and knowledge) is recognized to be an inherent part of reflective practices described by Schön (1984) and has more recently been discussed by Redström (2017) in relation to design theory. Stappers and Giaccardi (2017) discuss cases where researchers had to explain and defend how their prototypes were measurement instruments rather than proposals for commercial products. However, in the two PhD projects discussed in this paper, prototypes were developed with this dual aim in mind from the start. Both PhD projects involved constructing prototypes, from simple to complex ones, made out of different materials such as foam, wood, plastics and electronics. The prototypes of Stickz, for example, consisted of an aluminum core for toughness required for children to build constructions with them, and enclosed with a soft foam shell and sleek finish for safety and hygiene. The prototype of Fizzy

made use of a commercially available product, Sphero™, for which a foam shell with an artificial leather finish was created for making it suitable for rough and tumble play as well as easy cleaning. The tin-can telephone AscoltaMe and interactive dispensing machine Mr.V were more complex in their embodiment. These objects involved 3D printed encasing, tailor-made electronics, LED’s, motors, and audio connected by an Arduino™ platform (D’Olivo et al. 2020a; 2020b).

To understand how a design could bring about change from an interventionist’s perspective, prototypes needed to be appropriate for use by children and their families in the hospital or at home. In the early stages of the RtD process, prototypes were made as propositions that embody preliminary insights about the problems these families faced and the solutions they might need. These propositions were used to stimulate discussion with stakeholders during workshops including cancer survivors, medical specialists, designers, and engineers. These discussions focused on their desirability as future products for children and families, how they could be realized technically, and how they could be part of a development-oriented care approach. For example, an initial sketch of Mr.V fostered discussion about how an artefact used in the home should be appealing to everyone in the family (older siblings, parents, etc.), how the social workers at the hospital might decide on who might be helped with such a device, and how its use might become part of the care-services they provide when the child spends time at home. In later stages of the process, these prototypes required a higher level of fidelity for them to be deployed in the field and set strict requirements on their safety and usability when used by ill children in the hospital and by the families in the home. In the case of Stickz and Fizzy this meant they needed to be designed with smooth surfaces that could be easily cleaned to avoid germs and bacteria to settle that might cause infections. For AscoltaMe and Mr.V, which included electronics, this meant they needed to be tested to obtain CE certificates to be safely used at home. See Figure 2 for a sequence of images showing the various prototyping stages of Mr.V.

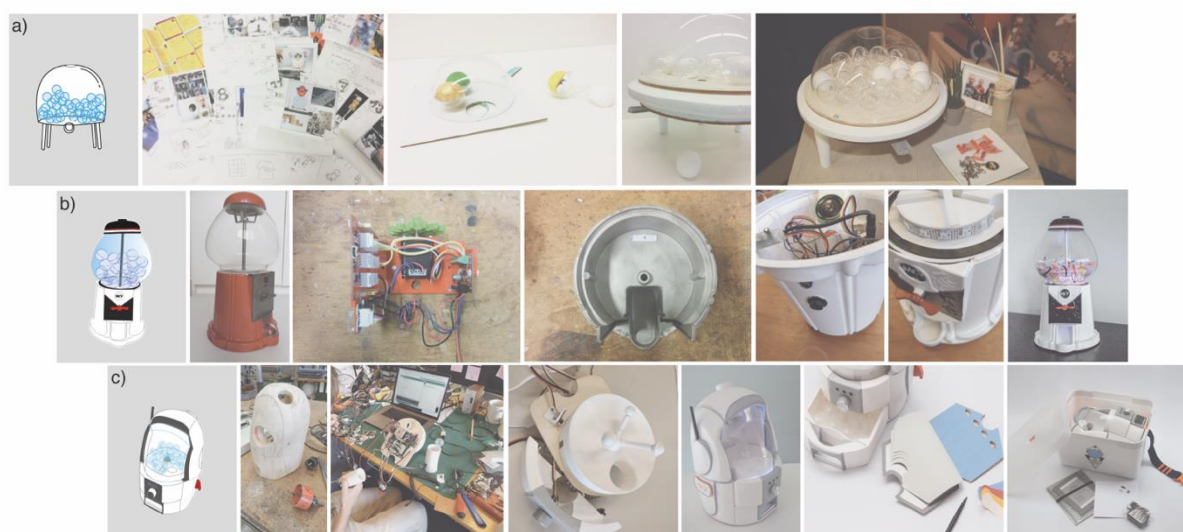


Figure 2 A sequence of images showing the various prototyping stages of Mr.V, across: a) its initial conception, b) the first prototype deployed in the field, and c) the second (more technically

elaborate) prototype, also deployed in the field. Images show details of the used materials, stylistic feature and ways in which technology has been integrated.

Prototypes have significance in research as objects of inquiry (Buchenau and Fulton Suri, 2000) and there has been an ongoing discussion in RtD about the role and function of prototypes as part of an inquiry process (Lim et al., 2008; Blythe, 2014; Stappers, 2014; Odom et al., 2016; Redström, 2017; Giaccardi, 2019). In the making of prototypes, the PhD researcher can experiment with how to express particular qualities or address particular research questions. Once made, the prototype enables new behaviors to be observed during field testing. The research method in the former is ‘designerly’ reflection-on-action (Schön, 1984), in the latter, traditional methods from social sciences can be used (Stappers, 2014). Yet, there are different ways in which these modes of inquiry can be combined. In the project of Boon for example, prototypes were made as instantiations of the—initially defined—Playscapes perspective. Each prototype was specifically crafted to embody three play qualities defined by the concept (i.e., bodily, free, and dispersed play) and were then investigated on how these embodiments would lead to the intended kind of interaction. In D’Olivo’s work, the notion of Tactful Objects emerged during the iterative process of multiple making and testing cycles. In contrast to Boon’s Playscapes, the design perspective was not defined beforehand but rather became articulated while crafting the prototypes, experimenting with how to shape their expressive qualities, and learning more about how people experience them. The articulation process also guided the discovery of theories that informed the design perspective. For instance, ecological theory informed D’Olivo’s approach when she developed preliminary models for intervening in family contexts. Crafting the first interactive prototypes called for theories on nonhuman agency, shaping the understanding of how artifacts can influence family dynamics through their presence in the home.

Making prototypes required engineering efforts with different technologies (the manufacturing of mechanical structures, software, and electronics) in order to make them sturdy, stable, and appropriate for deployment in field studies. Using ready-mades, commercially available technical components, and hacking existing products, was found to be a good strategy to construct high-fidelity prototypes within a limited amount of time. Prototyping was also part of an academic reasoning process informed by theory. The challenge for the PhD researcher is about how to best orchestrate making prototypes in the RtD process by considering the available time and resources within the context a PhD project. We capture this challenge by the question by asking ‘what’ should be made, to know ‘what’ and ‘when’, in a process of developing towards robust integrated products as part of the research inquiry. When looking back on the different prototypes that have been produced, we find it helpful to distinguish between three types of prototypes along this process as scaffolding tools: ‘provotypes’, low-fidelity models for provocations to align stakeholders (Boer and Donovan, 2012), ‘pretotypes’ that propose what to build before building it (Savoia, 2011), and high-fidelity ‘prototypes’ in the traditional industrial sense of ‘the testing version of the proposed end-product’. This will allow the PhD researcher to build-up direct-impact solutions in close alignment with knowledge development.

2.3 Collaborating with stakeholders in complex and sensitive settings

The third and last challenge is about working with a diverse set of stakeholders and doing fieldwork as a PhD researcher in a complex and sensitive setting, such as healthcare (see Groeneveld et al. (2018) for a discussion). PhD researchers may need to facilitate the participation of stakeholders within design and research related activities with varying levels of commitment and involvement (Vines et al., 2013). Curiosity and empathy help to understand the needs, experiences and practices of the people who are part of the context of intervention (Kouprie and Sleeswijk Visser, 2009), while working in other academic territories may involve learning new research cultures and jargon that might be alien to your own (Repko et al. 2007). Furthermore, tact and wit come in handy when navigating socially sensitive and political landscapes. Collaborating with others thus requires PhD researchers to be carefully listening to the people they are working with while at the same time explaining their own way of working as a design researcher.

The field of pediatric cancer care is such a complex and sensitive setting. We engaged with children who are undergoing cancer treatment and who might be feeling ill from it, and interacted with parents who worry about their child's health and who are busy managing their often-disrupted daily schedules. We also worked with many healthcare professionals including medical doctors, physiotherapists, psychologists, child-life specialists, and nurses, who each can have a different role in the process and a stake in the research outcome. Doing research in the medical domain further involved following stringent medical ethical committees and procedures for carrying out fieldwork. This taken together called for the need for a shared vocabulary that could bridge the design and healthcare domains, and further asked a lot of energy from the design researcher as well as empathy while keeping an emotional distance too. For example, the terms "intervention" in healthcare raises associations of large studies (random controlled double blind, and stringent medical research protocols) while in design, the term intervention is used more flexibly and may include ways of probing that involves large studies but also smaller types of experiments. The procedures also affected the planning of fieldwork with exploratory studies. Medical Ethical Committees require a well-documented description of all possible outcomes beforehand, and it can take several months before permissions come through, all affecting the dynamics of the research.

While both PhD researchers needed to familiarize themselves with the medical domain in terms of the particular jargon, practices, and protocols, it also took time for the medical partners to understand how design research works, what RtD is about, and what to expect from it. We noticed how the so-called 'fuzzy front-end' of the design process was difficult for stakeholders to understand. It did become clear, and led to enthusiasm, when the first concrete design proposals were presented. For the different stakeholders, this initial phase of imagination, exploration and trying things out, felt mystical and opaque. Their trust and understanding of the RtD process became stronger when design concepts crystallized into concrete prototypes. As referred to by Star and Griesemer (1989), it allowed different perspectives to become clear and meaningful (as a boundary object) in relation to shared objectives.

We propose that PhD researchers immerse themselves in the context to observe and understand people's ways of working, similar to the approach of anthropologists. In doing so, they can gain firsthand experience in developing an understanding of local cultures and practices. This necessitates stakeholder interest, trust, and commitment. To this end, we learned about the importance of cultivating strong relationships among participating organizations during the project's preparation phase, maintaining open communication throughout, and ensuring the continual presence of the PhD researcher at various related working sites. Such endeavors also demand confidence and courage from the researcher, who is learning to appreciate the values and merits of RtD, yet also needing to collaborate with people who may not be familiar with design as a research discipline. We further observed how prototypes create a common ground for different disciplines to come together (Björgvinsson et al., 2012). The prototype scaffolding process discussed earlier, progressing from lower to higher levels of fidelity, may prove valuable for conducting a kind of RtD that commits to intervening in real-world settings. Additionally, publishing in other academic fields can be so specific that we learned how close collaboration between team members with different academic backgrounds is crucial. As a result, one of the studies with Mr.V has been published in an academic medical journal, extending beyond the field of design research (see, Van Bindsbergen et al., 2021).

3. Conclusion

In this paper we have discussed three challenges that we faced as members of the research team and suggested ways to deal with them. The first challenge entailed how to reconcile the tension between the role of the PhD researcher as a 'designer' (who helps frame and solve a particular problem) and as an 'academic' (who is developing knowledge). We also touched upon how the notion of 'intermediate-level knowledge' can help to find a synergy between these different orientations. We then discussed the challenge of making prototypes as practical interventions to be deployed in the field and as manifestations of theory, and suggested how scaffolding the making of RtD artefacts from simple models to research products can help articulate prototypes as carriers of research that become increasingly embedded in the context of use. As the last challenge, we discussed how collaborating with stakeholders in RtD projects that are sensitive and complex requires empathy as well as emotional distancing, needs effort to establish common ground, and takes time to deal with rules and regulations of the participating organizations. We suggest that design researchers immerse themselves in the context of study from the start and organize participation around the developing prototypes, for that we have learned, sparks enthusiasm in stakeholders and promotes their understanding of the research aims and methodology.

The experiences that were articulated in this paper can help furthering knowledge on RtD as a research methodology by sharing how particular tensions have played out in practice. As such, our learnings can help fellow design researchers to set-up new RtD projects by using them as points of attention in both the planning and carrying out the research. The anecdotal material may also help to pin down and bear evidence to new concepts and strategies

that have been developing within the RtD communities emerging within design schools, universities, and design research networks. As RtD is gaining traction in a broader set of communities, different aspects become highlighted (Boon et al., 2020). Therefore, we expect that when RtD is increasingly being used as a research methodology in collaborative multidisciplinary research projects, considerations like the ones presented in this paper will further spread, grow, and mature.

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