Design Research as *Free-thinking*

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Abstract: Research and practice have different boundaries that afford each unique strengths. To investigate how research and practice meet we discuss three research through design cases: (1) Designing for Rich Interaction, (2) Library of Skills and (3) Fonckel. Reflecting on the cases we discuss two patterns in detail: (1) research and practice have different boundaries and (2) design research seems to be rather disjunct from practice. After this we explore if these boundaries can be conquered in order to close the gap between research and practice if we find ways to operationalize the unique possibilities that the two worlds have to offer. We see that design research is deploying its research vehicles more and more in society in large-scale longitudinal experiments. This provides opportunities for research and practice to meet through these experiments for example in Experiential Design Landscapes so that a common value system can be built. Finally we come full circle and plea for university to remain a place for '*free-thinking*'; a place where research can explore beyond the boundaries of practice.

Key words: Design Research, Free-thinking, Research and Practice, Different Boundaries

1. Introduction

There are many different ways in which design research and design practice can meet. For example, a university can provide design competence in contract research (e.g., [3]), or practice and research can meet in large-scale internationally funded projects (e.g., [9]). But design research can explore where practice cannot and vice versa practice can go where research cannot. Research and practice have different boundaries. These different boundaries are instrumental in the unique strengths that both design research and design practice have to offer but they also cause a separation. Design research and practice are to a certain extent disjunct. This is what we discuss in this position paper by means of reflecting on several case studies.

2. Case studies

Our view on how design research and practice (should) meet is strongly flavoured by our research approach. We outline three design research cases below in which we discuss intent and outcome after which we reflect and seek patterns. These design research cases have been performed in the Designing Quality in Interaction (DQI) group in the department of Industrial Design at the Eindhoven University of Technology.

These projects share a common Research through Design (RtD) approach [8]. In this approach design is instrumental in generating knowledge. A research phenomenon is explored through the act of designing inspired by theory, exploring the impact of theory and even extending theory. The artefacts that are the result of this approach are called research vehicles: high quality prototypes with product characteristics. The approach yields knowledge on different levels: it gives both insight in the process of how to design and it gives insights on the

artefacts themselves as they write knowledge in the language of design. The crucial difference of this research approach in relation to the design approach that is used in practice is that the research vehicles of a RtD process addresses not a user need but a research question [6].

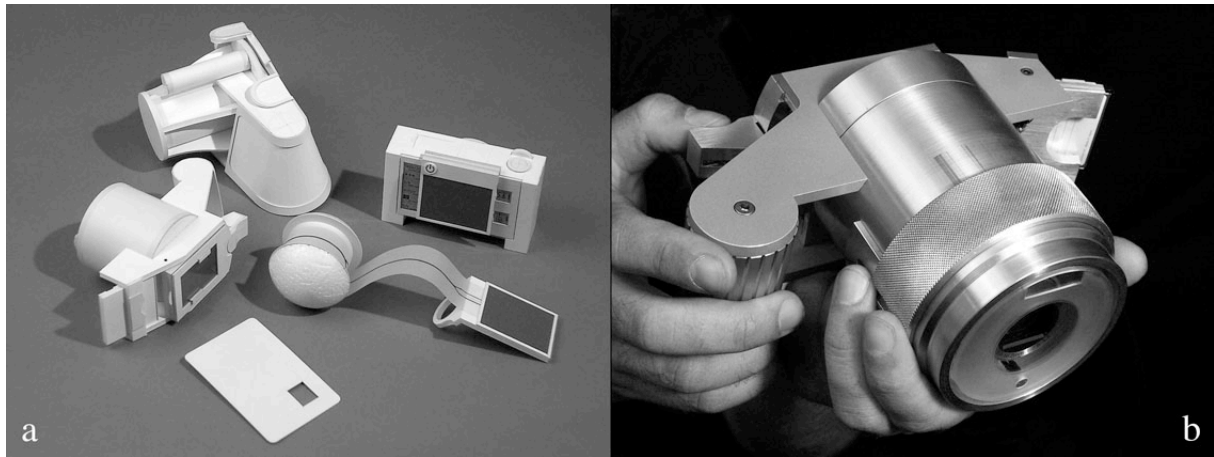## 2.1 Designing for Rich Interaction

Figure 1, a) lo-fi design explorations of interaction style b) working prototype of the rich actions camera

Rich Interaction is an alternative interaction style that was explored in the doctoral work of the first author by designing a series of cameras each featuring a different way of operation [6] (see figure 1a). It culminated in a modular design of a camera with a rich interface (see figure 1b). This camera was a research vehicle; it acted as a 'physical hypothesis' exploring the question '*if it is possible to diversify interaction style beyond the 'menu on screen with navigation buttons' –paradigm, and how this can be done*' [6, p.29]. Or, in other words: how to design for Rich Interaction.

The Rich Interaction project started with the first author's frustration with current interactive products that offer a standardized interaction style and ended with an alternative interaction style. But it is crucial to understand that the research question and the design challenge were strongly intertwined. The research question was not formulated before the design challenge started; it grew as a result of the growing insights through designing. First by a series of lo-fi prototypes to explore and understand the Rich Interaction phenomenon, then by a full-fledged working prototype to validate it against a more conventional interaction style.

The camera, however, was not a product as such; it was never meant to enter the market. Instead it was designed to explore, understand, and present new knowledge on how we can interact with products. In the type of research that was pursued, design was used as an instrument to do research with and not as a goal in itself. The cameras opened the solution domain of Rich Interaction: The act of designing was the act of defining rich interaction. Reflecting on the process the research question grew from implicit to explicit. It used design as an instrument for research but stepped outside of the boundaries of design practice in that it explored a new interaction paradigm and not created a solution to a design challenge, e.g. it did not focus on costs, material usage or manufacturing. It addressed a research question and not a user need. It took different constraints than a design project in practice would, while still operationalizing the power of design.
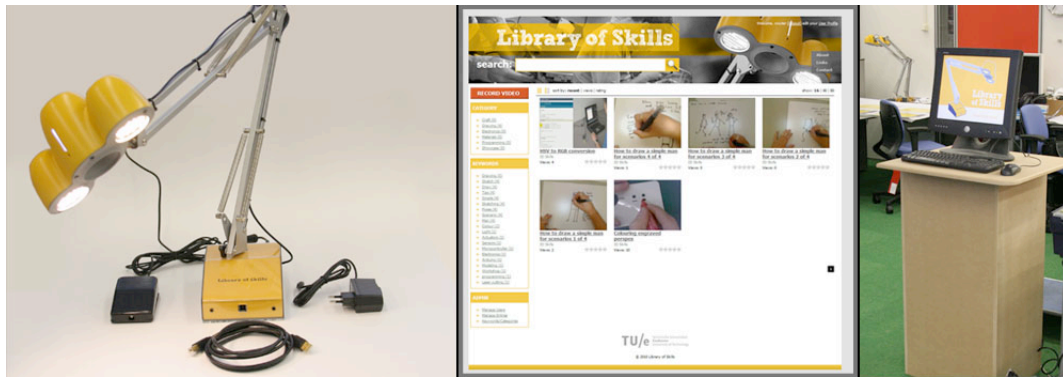
2.2 Library of Skills

Figure 2, image of the Library of Skills – Camera, Repository, Kiosk

The Library of skills system is a repository of design skills and knowledge that was designed and built for use in our department of Industrial Design. It was an elaboration of the master graduation project of Wouter Kersteman, who developed it further together with the first author and Panos Markopoulos. It consisted of a series of custom camera units and kiosk style dissemination units that were distributed in the department (see figure 2). The custom camera units were placed at shared workspaces (electronics workshop, textile lab, etc.) and were designed to effortlessly record the workflow without interrupting that workflow.

The Library of Skills was meant both as a research vehicle to understand the dissemination of skill as well as a functional system to support the educational system. While not meant to enter the market as such, it was intended to be used in our department, adding a very practical design challenge to the research challenge. Here design was used both to create a functional system and as an instrument to do research with. The Library of Skills project aimed to both empower our department of ID by allowing students and staff to share their design skills and knowledge, and to gather insight in the dissemination of skills. The project was built to be completely operational.

Despite the effort that was spent in creating a fully functional system it proved to be extremely difficult to bootstrap the project. It was completely functional but it was difficult to motivate staff and students to use the system. After a year of uptime the system was taken offline. As such the system was not successful as a design. However, as a research project it was successful as it yielded very valuable insights on how to develop such a system and how to disseminate design skills and knowledge (and how not to do it).

We took the liberty of trying out something that seemed a good idea and learned from it. We completely implemented the system to a level that it could be used and released it to our community. The project failed from a design practice perspective, but was successful as a research project. In our view this goes beyond the boundaries of practice. It is not that such things do not happen in practice, we think of start-ups funded by angel-investors, but research has the intention to regard not only the success or failure of a project, but to learn from it and to disseminate those lessons. Research is setup to experiment and to embrace uncertainty practice generally is not.

2.3 Fonckel

Figure 3, a) the AEI light fixture in use b) the spin-off product Fonckel One

A third project that we wish to discuss here is the doctoral project of Philip Ross on ethics and aesthetics in intelligent product and systems design [12]. The RtD process received input from a series of experiments with dancers that explored the expressive dimensions of the different values, as well as from a series of design explorations. All steps in this RtD process were meant to explore and understand the relationship between ethics and aesthetics in product design, operationalized in Schwartz's Human Value System. It culminated in a light fixture called AEI that was capable of eliciting different human values in its users: creativity, social power and helpfulness (see figure 3a).

AEI was designed as a research vehicle. It was designed with much eye for detail aiming for subtlety and nuance as the subject under investigation, ethics and aesthetics of interaction, thrives on those qualities. The resulting interactions proved to be not only crucial for the insights that Ross was after, but also novel and patentable. The AEI-lamp was such a compelling design that Ross decided to bring it to the market, the patents made that possible. The AEI-lamp was redesigned for mass-production and entered the market as 'Fonckel one' (see figure 3b). While not the original intent, Ross proved that design research vehicles can in fact be brought to the market.

At the same time it is essential to also see that the 'Fonckel one' capitalizes on different properties than the AEI-lamp did. As a research vehicle it was instrumental in exploring if a product could elicit different human values including if it could evoke helpfulness, as a commercial product that behaviour did not make sense. The essence of the artefact shifted from experimentation to practical use. The touch control remained, but the diversity in behaviour disappeared. Manufacturing and reliability issues entered the equation and became leading. Although the 'Fonckel one' missed some of the features that were essential for the AEI-lamp as research vehicle, it did beautifully showcase many of the interaction principles that were explored in earlier design research projects in our research group.

3. Reflecting

The knowledge that was yielded from these research projects was disseminated through different routes: it was presented in the research community but also presented in design offices, and it entered the market directly in the form of a spin-off. Reflecting on these cases there are two observations that we want to share: (1) research and practice have different boundaries and (2) design research seems to be rather disjunct from practice.

3.1 Different boundaries

The three cases that we present above show different intentions and approaches in doing research. The first case is really about exploring a new interaction paradigm and sharing the knowledge that is yielded. The second case is meant to yield knowledge but also to offer a specific functionality. The third case demonstrates that a research vehicle can be elaborated into a product that can enter the market. What these projects share is how they use the context of the university as a safe haven for the research questions to yield knowledge and insights. They exploit the possibility to explore where practice cannot, as these cases both explore the opportunities and the dead ends.

In our opinion one of the roles of design research is to further the limits of the practice but also to make the most of the fact that there is no monetary consequence of failure. Design research can dig deeper where practice cannot, and in design research failure is, in fact, an option. The camera, for example, was not a product; it will never be on the market in its current incarnation and was never meant to. It is a physicalization of ideas that would have never seen light in practice; it took design research to go there.

Design practice in its turn can go places where research cannot: practice brings products, systems and services to the market. While research regularly brings research vehicles to users in experiments, either in controlled environments or in longitudinal, contextualized environments, research is ill equipped to bring products to the market. To bring a product to the market brings responsibilities that go far beyond the pursuit of knowledge: the product needs to be manufactured and supported. This process is far from trivial. While the route of start-ups is, of course, a feasible route as Ross demonstrates this mostly means that these products move out of research and changes characteristics. A product has a different purpose than a research vehicle, and thus a different life span, different production methods and a different relationship with 'users'. Ultimately the reasons to design are different. Despite higher goals that both research and practice have, in research design is instrumental in 'producing' knowledge, in practice design needs to keep the shop afloat.

3.2 Relation between research and practice

From a more critical perspective, because the Rich actions camera, the Library of Skills and to a lesser extend also the AEI-lamp exist only outside of practice it is not a certainty that the ideas will actually re-surface, in new forms, on the market. A particular concern is that practice seems rather conventional when it comes to interaction styles. It is one thing to create a spin-off and bring a research vehicle to the market as Ross did, it is another thing to induce a change in practice through the knowledge that was produced by design research.

We feel that practice has the tendency to not divert too far from the mainstream. For example, when we look at design for interaction we see very few products that break with the menus on screens paradigm. Even a company like Apple that is notoriously famous for its tendency to 'think different' does not break with this paradigm. The stakes are too high to fail and the road is a difficult one, screens are easier to adjust than hardware. What does not

help either is that the time-span that is allowed for a project in practice to become profitable is often short. Finally, a commercial company caters to an audience that might not be consciously after something different. On the other hand, change is possible, also in a conventional market. Nintendo showed this when they introduced the Wii that changed how we control games. It introduced motion-based input as an alternative to the button-based input of before, paving the way for a whole new gaming paradigm that is now widely adopted.

Next to this we feel that research and practice do not meet. Where for example the medical sciences are connected to their practitioners by shared journals and conferences this seems to be less the case in design. Of course literature positions design research in a meaningful relation to practice (e.g., [4]) but this relates to industry rather than design practitioners. We have the strong impression that design research is often seen as a theoretical exercise without consequence for practice. As a design researcher it is not uncommon to be asked by a practitioner for the relevance of research. Design exists in the cross-section of different disciplines and has always built on the advancements in these disciplines. Design-research itself is a fairly new phenomenon that has not yet found its place comfortably in practice. There seems to be no trust relation between research on the one hand and practice on the other hand. Practice is committed to advancements both in tools and technology but there is little connection to design research that concerns new forms of artefacts or interaction for example. A different reason for the gap between research and practice is that there are not many schools of industrial design that emphasize theory and science [10]; if a designer has not experienced design research he is probably not prone to value it or even to understand what it is as the word *research* has different connotations in practice than it has in research [5].

A final reason for the dichotomy between research and practice has to do with the underlying value systems both in approach, and in the qualities that are aimed for in the designs. Research (like we approach it) is interested in exploration; it is inherently open for new and different qualities to design with. It emphasizes values like the aesthetics and poetics of interaction, respect for the human body, skills, and values, aesthetics of narrative and such. Practice has, of course, an eye for aesthetics and human values as well, but operates within the confines of convention. It emphasises commercial viability and as such efficiency.

4. Discussion

In this past paragraphs we have emphasized two things: (1) research and practice operate within different boundaries and (2) research and practice are rather disjunct. While this might be the case we wish to discuss if these boundaries can be conquered in order to close the gap between research and practice if we find ways to operationalize the unique possibilities that the two worlds have to offer.

Design research is scaling up from small-scale, controlled experiments to large scale experiments that take place within society. In a way it has to break through the boundaries that we just sketched, as these experiments necessitate research vehicles that are of a fidelity level that goes far beyond the research vehicles that were discussed in the cases before. While we feel that this provides an enormous challenge the first steps have been taken in that direction, e.g. through Living Labs [1] and through our own approach called Experiential Design Landscapes (EDLs) [7] in which we take the RtD process into everyday life. In these EDLs we deploy Experiential Probes, which are open, sensor-equipped 'propositions for change' allowing and facilitating new and emergent behavior. By allowing people to use these propositions in their everyday life, the RtD team involves people into the research about and development of new systems, products and services [11]. Due to the

complexity of the challenge EDLs address, the openness of EPs and the way they are interwoven in everyday life, EDLs are developed with an extensive group of stakeholders from research, governance, industry and enterprises, including design researchers and more and more also designers from practice. Related to Experiential Probes are 'provotypes' [2], which could also be an instrument to bring research and practice on the same page.

The responsibilities of design research scale up and research vehicles that are released 'in the wild' need to be fit to meet the challenges of real, longitudinal use. Although it is great to see this happening, we would urge that the 'final' boundary, the boundary of purpose should not be blurred. We feel that the motivation of research is, and should be advancement of knowledge. Research should not enter the competitive arena of bringing products to market and having monetary benefits for reasons of independence, the option of failure, and the moral obligation of not competing with its own students.

The benefit of the approach that we just sketched is that research gets a face in society. As we outlined above, the gap between research and practice also has to do with a difference in value system. Large scale longitudinal experiments in a societal setting gives research the option to both tune its value system to society but also 'educate' society in different values, adding relevance to the research proposition. Therefore, it makes sense to have practice participate in such experiments so that common ground can be found for a common value system to blossom.

Finally, we see the design field could also benefit from structural platforms to collaborate in RtD projects and in which knowledge from both worlds can be shared. We see several of those platforms appear internationally, and which resulted in the Netherlands in Design United, a platform for Dutch research in design, that aims at combing the academic and professional power of the field of Industrial Design and strengthen the innovative force of Dutch design practice, industry and research.

5. Concluding

In this position paper we have outlined our thoughts on the relation of research and practice. we showed three design research cases through which we explored the boundaries of research but also the boundaries of practice and where we argued that research and practice are, to a certain extent disjunct. We discussed a way to close this gap between research and practice but in this last piece we want to come full circle and advocate a vision where design research is a place for '*free-thinking*'.

We feel that the community of design research should allow for projects that explore beyond the boundaries of practice. In fact we feel, that a university is, and should be an environment where new ideas, through serendipitous ways, can bloom. But we need to find new ways of disseminating design knowledge and to connect to practice. Particularly in case of design this is not a straightforward process as design research is still finding its own niche in research methodology. Practice has different ways than research has.

Concluding, we argue that an important aspect of design research is to '*free-think*', to explore beyond the boundaries of practice. On the other hand we need to find ways to be closer to practice. We feel that our students are instrumental in this as they are an important route to disseminate our insights and knowledge. We educate them to have an open and responsible mind when it comes to design. We aim for a paradigm shift were our students are instrumental in changing the value system of our society helped by research also claiming a presence in society.

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