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EXPLORING THE COMPLEX: METHOD DEVELOPMENT BY RESEARCH THROUGH DESIGN

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ABSTRACT

The emerging design landscape in the transformation economy is characterized with the prevalence of product-service integrations and the search for solutions to social challenges. In such a context the problems handled by the design practice grow in scale and complexity. Collaboration across disciplines and with various stakeholders are increasingly being valued in the design process.

This trend calls for new methods and tools to support the trans-disciplinary design and requires integrating knowledge from different disciplines which eventually poses unique challenges to the researchers conducting research in a context with multiple interrelated variables.

This paper presents a research through design approach that is used for developing a collaborative design method in a trans-disciplinary research context. The research through design approach is selected since it is a suitable approach for dealing with complex situations in design research. The applied research through design process is presented and discussed with the purpose of demonstrating the potential of such an approach and guiding the researchers in similar research contexts.

Keywords: Research through design, method development, trans-disciplinary research, collaborative design, transformation economy paradigm, stakeholder involvement in design

1 INTRODUCTION

We are entering into a new economic paradigm, transformation economy, which is driven by a new set of values (Brand and Rocchi, 2011). The size and urgency of social and environmental issues, the global spread of knowledge and the public awareness raised by the online debate came together to define the beginning of this new paradigm. The social and environmental challenges call for innovative solutions and provide new market opportunities (Brand and Rocchi, 2011). In this context the character and processes of design is changing with the role it has within the society, with a new focus on *designing for social change* (Sanders and Stappers, 2008; Peeters and Megens, 2014).

This change eventually requires new approaches, tools and processes in design. The design activity in the transformation economy deals with complex design problems such as designing interactive products/services and designing for social transformation. Therefore it requires systemic thinking to deal with "wicked" problems, and more interdisciplinary and inter-organizational

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collaboration, with inclusion of not only end users, but also stakeholders and communities (Gardien et al., 2014; Den Ouden and Valkenburg, 2012). It also requires integration of knowledge from different disciplines with a trans-disciplinary approach regarding the scale of the design problems and multitude of the stakeholders involved (Brown, 2009).

In addition, in the emergent design paradigm, the integration of technology platforms and data gathering technologies require an iterative process for interactive product/service development. Conventional product development proposed a relatively linear process, in which the business decisions took place later, at least separate from the design decisions, typically in a single company context. In the new paradigm however, business and design decisions are required to be taken into account together and developed in a fast and iterative way (Gultekin-Atasoy et al., 2014). Therefore new tools and methods that conform to the conditions of this emerging landscape are needed to support the design process (Gardien et al., 2014).

So, what are the methods that are needed to guide the design activity in this new context? And how can we develop these methods, by considering the complex set of factors that shape this new paradigm?

Our research is driven by these questions. In this paper, we will present a research through design approach that we applied for method development in the course of a trans-disciplinary PhD study. The aim of the PhD research project presented in this paper was to develop a method to combine user insights and business insights in the early stages of the design process, in support of multi-stakeholder collaboration. Due to the suitability of the research purpose and context, research through design was applied as an approach for method development in the context of this study. In this paper, we will introduce this research through design approach, which is found useful to develop intermediary knowledge for method development in trans-disciplinary research projects.

In the following part we will provide an overview of the characteristics of trans-disciplinary research and research through design approach. Then we will present our context of research and our motivations for choosing research through design approach for method development, followed by our process of how we applied this approach. We will finalize with presenting our insights on applying research through design for method development.

2 TRANS-DISCIPLINARY RESEARCH

Trans-disciplinarity is an emerging approach in design (Brown, 2009) and research, for addressing the “complex, multi-stakeholder real life problems with high social and environmental relevance” (Gaziulusoy and Boyle, 2013: 140). Trans-disciplinary studies deal with complex phenomena and aim for integrating different types of knowledge, across disciplines and from theory and practice, among others. Trans-disciplinary research:

- aim to solve socially-relevant and contextual problems rather than discover generic facts;
- have evolving methodologies throughout the research;
- transcend boundaries of disciplines and therefore require collaboration and coordination between different disciplines;

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— generally require participation of or, when this is not possible or feasible, including the perspectives/knowledge of non-scientific stakeholders in research, and;

— are normative, i.e. they aim to transform the problem domain. (Gaziulusoy and Boyle, 2013).

Gaziulusoy and Boyle (2013) further identify that these solution-oriented, integrative and participatory characteristics of trans-disciplinary research poses unique challenges to the researchers, such as reviewing and integrating literature and theory across disciplines, and obtaining an equal depth of knowledge in all disciplines of trans-disciplinary research. Consequently the research process evolves in many layers, through which “the problem will be reformulated, values and norms will be adjusted and the skills and knowledge of the researcher will increase as the project progresses” (Gaziulusoy and Boyle 2013: 142). Therefore they point out the need for unique research strategies and supporting tools for individual researchers carrying out trans-disciplinary research.

3 RESEARCH THROUGH DESIGN AND INTERMEDIARY KNOWLEDGE

Design discipline deals with messy, problematic situations rather than well-formed problems, and it studies and alters the world of the artificial things, and these characteristics differentiate design from other scientific disciplines (Cross, 2001). As a result, the design discipline requires “‘designerly’ ways of knowing, thinking and acting” (Cross, 2001: 54) and needs research approaches and knowledge types specific to the design discipline to be developed (Schön, 1991).

Research through design is a design research approach that is proposed for complex design situations, such as interaction design, in which the dynamics of the design context is complex to identify and control (Stolterman and Wiberg, 2010). It is a form of applied research which aims to connect individual design cases to advance theory, while also producing intermediary knowledge, connecting theory and practice (Dalsgaard and Dindler, 2014). These characteristics make it a suitable approach to deal with the challenges of trans-disciplinary research projects.

Zimmerman et al. (2007) relate research through design with Rittel’s concept of *wicked problems* (Rittel and Webber, 1973). They propose the approach for (interaction) design practice, where many interdependent variables between the user, technology and the context cannot be studied in isolation. The solution domain is broad, the understanding of the problem can be limited or the problem can be ill-defined therefore these situations are not approachable by scientific or engineering modes of inquiry, or through rational problem solving (Zimmerman et al., 2010; Hummels and Frens, 2008; Tieben, 2014). As there can be more than one way of solving a design problem, the goal is defined as achieving a *preferred state*, optimized for the current situation (Zimmerman et al., 2010). Research through design is stated to be a suitable research approach for designing and generating knowledge in such situations with its holistic approach, suitability for integrating knowledge from across disciplines, iterative approach to reframing the problem state and output as the preferred state (Zimmerman et.al. 2010).

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Research through design typically generates an *intermediate level of knowledge* which is accepted to serve useful for the progression of design theory and practice (Stolterman and Wiberg, 2010; Hook and Lofgren, 2012; Dalsgaard and Dindler, 2014). Dalsgaard and Dindler (2014) mention that since theories are abstract, it is usually difficult to apply theory in relation to particular design situations. Therefore an intermediary form of knowledge that resides between theory and practice is necessary. Stolterman and Wiber (2010) argue that since the object of study is constantly changing and refuses to be stabilized in design, theorizing can be done as a sense-making act. Therefore it is meaningful to challenge theories through an exploratory process by means of designing artefacts and the generated insights to enrich theory.

The intermediary knowledge is generated through practice, in several levels. Firstly, through realizing concepts and prototypes, the designer/researcher integrates different types of knowledge and contextualizes those (Stappers, 2007). Prototypes are the carriers of knowledge, they “instantiate hypotheses from contributing disciplines, and to communicate principles, facts and considerations among disciplines” (Stappers, 2007:87, Stolterman and Wiberg, 2010). Secondly, through this practice, the theories and hypotheses are put into a kind of test, and new knowledge appears through this confrontation, when the researcher discovers things that would remain unnoticed. Thirdly, the process of creating prototypes is a potential generator of knowledge, which results in frameworks, methods and debates on future design practice (Stappers, 2007; Stolterman and Wiber 2010; Koskinen et al., 2011; Tieben 2014). Reflection in/on action is an important aspect of generating knowledge from practice, based on Schön’s idea of reflective practice (Schön, 1991; Frankel and Racine, 2010). Through the reflection on the design process and the outcome, new knowledge is fed back to the theory and new hypotheses can be generated (Tieben, 2014; Hummels et al., 2007; Stappers, 2007). Without the reflecting act, one cannot speak of generating new knowledge through practice (Stappers, 2007). Stolterman and Wiberg (2010) define the creation of intermediary knowledge as a circular process, through which both theory and use situation are aimed to be improved with concept design.

4 RESEARCH THROUGH DESIGN FOR METHOD DEVELOPMENT

4.1 RESEARCH OBJECTIVE, SCOPE AND CHALLENGES

To address the challenges of the design process in the new paradigm, the aim of our research is to combine user insights and business insights in the early stages of the design process, to reduce uncertainty and enrich the design proposal. We would also like to support the involvement of the stakeholders in the design process to support collaboration. Our main intention is to produce intermediate level knowledge, combining theory with practice through developing a method and a tool for applying this method.

One challenge in our study, as in many other method development studies, is to define guidelines that are applicable by the practitioners in real-world design cases. There have been many methods developed as a result of the research activity conducted in the design and engineering fields, to support the complex design processes in the past decades, however the amount of the methods that has been adopted by practitioners is reported as significantly low (Daalhuizen, 2014; Af Örnas et al., 2014). Daalhuizen (2014) argues that, the main approach in design methodology has been to develop object- and context – independent

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procedures, irrespective of the designer and the context, with the ideal to systematize design. As a result method developers overlooked the role of the designer, the design situation and the contextual factors that affect method usage.

Then he emphasizes that methods should not be seen as abstract sets of knowledge. Method usage is situational: methods are applied by designers/practitioners, as optional and flexible means to help achieve goals (Daalhuizen, 2014). Therefore the situational context of the method usage should be considered in the method development, and should provide flexibility to support the practice. Departing from the same view, we argue that this requires contextual information to be taken into account during the method development phase.

Given these motivations, our research is characterized with the following challenges:

Trans- disciplinarity: The context and dynamics define a complex set of interrelationships at the intersection of two inter-disciplinary fields: user experience design and business process design, positioned in the context of innovation studies and stakeholder involvement in the design process. The studies in these fields are fed by theories from different disciplines. This poses challenges for the researcher to develop the full understanding of the context.

Designing for the design process with a wicked character: The fact that our research context covers the involvement of external parties/stakeholders in the design process makes it challenging to identify and isolate the relations under investigation. The context has complex dynamics and is shaped by intervention: one cannot speak of collaboration without intervention. Therefore it is not possible to compare the intervention's success by comparing it to the non-intervention condition. Similarly, it is not possible to conduct controlled studies, since every design case is unique because it is a design process shaped by the design situation and individuals' contributions. Therefore it requires a holistic understanding and insight gathering to propose a solution.

New field, intermediary knowledge is needed: Due to the novelty of the research field, although there are many theories available, the intermediary knowledge on how to combine and apply those in the design practice is still needed. Therefore it is required to discover what the important parameters are and what is needed to design.

Insights on the design context are valuable for the application of the method: Method design requires context variables to be taken into account to provide specific guidance and flexibility in application. Also, due to the abstract nature of the communicated concepts, a supportive tool to apply the proposed method is required to guide the individuals in the practice. However the integrated complexity also poses challenges for the researcher to develop the full understanding of the context to design the method for.

Based on these characteristics, we applied a research through design process for method development, since the research through design approach is accepted to guide the design research processes with similar nature. Below we will describe how we applied it in our research process.

4.2 RESEARCH PROCESS

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The research through design process is applied as a part of the PhD study carried out by the first author on the research scope presented above, during the initial two and a half years of her study. An iterative research through design process was followed, through which the proposed method was developed by integrating knowledge from different disciplines, a tool that is adjusted to the needs of the application context was designed, and context related information was gathered to feed into the research and theory.

Collaborative design workshops were utilized as moments of intervention, which provided real-life test situations during which the method is applied and evaluated. A series of iterations are conducted in each design cycle. Each cycle was composed of the following interim design and research steps as explained below and presented in Figure 1:

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1. *Case selection (CS)*: Based on the research question, a relevant design case was selected. The context of the case was defined and requirements were identified with the interviews and discussion with the “clients” of the workshop. The context requirements and expected outcome provided the researcher an initial direction to define the intervention requirements.
2. *Method and Tool Design (D)*: The researcher proposed a general setting and agreed with the client on that setting. At this stage, the researcher consulted the literature to search for related knowledge. She designed a process based on her insights from literature and the layout to be used in the workshops, which constituted the method and the tool designed throughout the PhD study.
3. *Intervention (W)*: The workshop was conducted, either facilitated by the researcher or other facilitators. The workshops were recorded for a more detailed analysis at a later stage.
4. *User evaluation (U)*: Workshop intervention was evaluated with users, either with post-session questionnaires or with interviews. In the cases where other facilitators were involved, the interviews covered them as well.
5. *Reflection (R)*: The researcher made reflections at this final step. In some cases, these reflections followed by a more detailed analysis of the workshop data. The reflections were made in multiple levels, as presented below:

R1: Reflection on the method and tool design: The designer/researcher reflected on to what extent the proposed process and the designed tool supported the collaborative design process. Based on the expected and unexpected outcomes of the intervention and specific instances observed/experienced during the workshop, insights were formed to improve the method and tool.

R2: Reflection on the contextual factors, in relation to theory: The designer/researcher made a reflection to identify the factors that were present in the application context. She consulted literature to support her insights from her intervention to relate her findings with respect to theory. She drew conclusions on the dynamics that can be present in other contexts that the method can be applied to improve the fidelity of assumption and related guidelines to apply the method.

R3: Reflection on the research scoping: Each intervention cycle contributed to the designer/researcher’s understanding of the research phenomenon. This understanding developed with the designer/researcher’s experience and knowledge over time. The designer/researcher reflected on the research question and research scoping based on the experienced results and improved them.

R4: Reflection on the research direction: Based on the increased understanding, the researcher defined the next intervention context and case selection, to improve the method. This reflection also progressed with a search for new theories to utilize, as a *way finding* act through the research process.

5 DISCUSSION

Our research context is characterized with the trans-disciplinary research challenges: dealing with complex and interrelated phenomena, need for

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integrating different types of knowledge -both across disciplines and theoretical with practical-, participatory research context and aiming to develop practically-relevant knowledge. We applied a research through design approach for developing a collaborative design method.

In trans-disciplinary research, it is challenging for the researcher to develop the full understanding of the abstract concepts and interrelations present in the research context and achieve equal depth in different disciplines (Gaziulusoy and Boyle, 2013). The research through design approach was experienced to be useful with helping the researcher to deal with the complex research phenomenon. Our approach helped the researcher to iterate with the proposed solution, while developing a holistic understanding of the interrelated factors of research, from the early phases.

The process also helped the researcher to find her way in the trans-disciplinary field, gathering insights that link to theory. The reflection level that we proposed on the research scoping (R3) and research direction (R4) levels provided the researcher to consider new research themes or theories to be applied and integrated on the way. The researcher gradually refined the research question and scoping. Carew (2004) suggests selecting and prioritizing the research material in order to limit the scope of the review and reporting of literature in trans-disciplinary research (Gaziulusoy and Boyle, 2013). Our approach also experienced to be helpful in dealing with the challenge of selecting the literature to consult throughout the research, through the themes discovered with the iterations.

Another advantage of our approach was on supporting the researcher to develop situated insights for method development. Through practice the researcher was able to develop the solution with iterations, gathering context-related insights and user feedback for method acceptance from the early stages of design. Therefore the resulting solution is expected to address situated method usage, as suggested by Daalhuizen (2014).

Finally, the research through design approach supported the researcher to develop her skills throughout the way. The hands-on process kept the researcher to be connected with the method application context and clients, and provided numerous instances to communicate the method and get direct feedback, both on the means of communicating the method and the design outcome.

When applying research through design for method development in the trans-disciplinary context, we adopted the approach for our own purposes of research. Our approach differentiates from the ones applied in the interaction design field in terms of the reflection levels defined throughout the process. Firstly, the reflections on the research scoping enabled the continuous refinement of the research question and framing. Secondly, the reflections on the research direction enabled the researcher to position the method and guided the case selection. This is different from the research through design approach for interaction design, where the main intent is to generate insights through practice. How to link the design iterations are not necessarily described as it may not be needed in a design case. In our situation, these reflection levels were utilized to guide the research process, helping the researcher to discover the relevant theories to be considered in research.

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Another aspect that we employed in research iterations was to collect user evaluations. This was necessary for discovering the context-related dynamics. We integrated user evaluations with the researcher's own reflections for the evaluation of the method.

The last difference is our focus on the method development. In interaction design, the 'design method' results from the process of designing. The designer's way finding actions in the design process may result in frameworks or methods developed on the way. In our research, the method and the tool was developed as two closely related "design objects", which acted as the carriers of trans-disciplinary knowledge, and developed with iterations. In that sense, we see 'method-tool combination' as 'products', which have their users as designers and stakeholders during the moments of contact and through the design process.

For the research through design approach to be applied in trans-disciplinary design research, we advise researchers to clarify the reflection levels early in the research process, also considering the long-term outputs of research. Reflections are stated to be an important aspect of the research through design, which supports knowledge generation and contribution to theory (Zimmerman et al., 2010). The structured level of reflections will help the researcher to maintain rigor and be aware of the depth of insights that he/she gathers.

The frequency of reflections should also be attended, since the understanding of the researcher will be continuously evolving throughout the process. This requires intensive documentation: not only during the data collection and observation stage, but also on how the research progresses. As also mentioned by Gaziulusoy and Boyle (2013), due to the integrated complexity, research direction setting action will happen over time, in parallel with the development of researcher's understanding. Relating the insights with the theory will continue over the research process.

The iterative nature of the process may be challenging for the researcher in terms of time management. Design cycles as we describe takes place between case selection and workshop implementation, which in some cases, may be very short. Therefore the researcher should get prepared for such a dynamic research process with many unknowns and quick iteration cycles. In that sense, we advise the researchers to be organized and adopt a mind-set of learning through exploration, where the failures will eventually be valuable opportunities of learning through reflection.

In addition, the researchers may also find it challenging to move in 3 different levels of theory, framework/method and tool design. In that sense scheduled documentation of process on all these levels may be necessary throughout the process. We also advise the researchers to reflect on the development of their skills for conducting research as suggested by Gaziulusoy and Boyle (2013), and on designing and communicating through the process, to frame their contribution in an efficient way. These skills will be developing throughout the research process, and researcher's awareness will be helpful in optimizing the research efforts invested in the project.

6 CONCLUSION

The emerging design landscape requires more iterative and collaborative ways of designing; therefore it challenges old ways of designing products and services. While new tools and methods are necessary to support the emerging design

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practice, the researchers are challenged with the complexity of the research phenomenon in such a dynamic research context. Research through design is a design research approach which is proposed to develop an understanding of a complex design/research situation. It is accepted to be suitable for dealing with complex situations and developing intermediary level knowledge for contributing to both theory and practice, by considering the context variables. Based on the integrated complexity in our research process, we chose to apply a research through design approach for method development to address a complex research phenomenon while also developing a method and a tool to support the practice.

In this paper, a research through design approach for method development is presented. Applying this research through design approach supported the researcher to generate insights that connect knowledge from different disciplines and on different levels. It also supported the researcher by providing a holistic understanding of a complex research domain and taking the situated method usage into account. Therefore it can be further adopted by researchers who conduct research with complex research phenomenon, such as is the case in trans-disciplinary projects.

The interim steps and reflection levels that we presented in this paper are necessary to maintain rigor and achieve depth in research, can therefore provide guidelines for the researchers who are willing to adopt a similar approach in their processes. The challenges that we identified through our process will be open for exploration by other researchers to improve the applicability of research through design as an approach for complex research contexts.

7 REFERENCES

- Af Örnas VH, Warell A, Larsson A, Motte D, Jagtap S (2014) The spread of product development methodology: Exploring drivers and barriers in Swedish Industry. *Paper presented at the Proceedings of NordDesign 2014 Conference, August 27 – 29, 2014, Espoo, Finland: 335-345.* Design Society & Aalto University.
- Brand R and Rocchi (2011) *Rethinking value in a changing landscape: A model for strategic reflection and business transformation.* Eindhoven, the Netherlands: Philips Design. Retrieved April 4, 2013, available: http://www.design.philips.com/philips/shared/assets/design_assets/pdf/nvbD/april2011/paradigms.pdf.
- Brown T (2009) *Change by Design.* Harper Collins Publishers.
- Buur, J and Matthews B (2008). Participatory innovation. *International Journal of Innovation Management*, 12(03): 255-273.
- Carew ALJ (2004) *Reflective and Post-normal Engineering: Models of sustainable engineering practice and their implications for undergraduate teaching and learning.* PhD thesis, University of Sydney, Sydney.
- Cross N (2001) Designerly ways of knowing: Design discipline versus design science. *Design Issues*, 17(3): 49-55.
- Daalhuizen J J (2014) *Method Usage in Design: How methods function as mental tools for designers.* Doctoral Dissertation. Delft: TUDelft

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Dalsgaard P and Dindler C (2014) Between theory and practice: bridging concepts in HCI research. *In Proceedings of the 32nd annual ACM conference on Human factors in computing systems*:1635-1644. ACM.

Den Ouden E and Valkenburg R (2011) Balancing value in networked social innovation. *In Proceedings of the Participatory Innovation Conference* : 303-309.

Frens J (2007) Research through design: A camera case study. *In: Michel, R (ed.) Design research now. Essays and Selected Projects*. Birkhauser Verlag AG.

Frayling C (1993) Research in Art and Design. *Royal College of art Research Papers*, 1(1): 1-5.

Frankel L and Racine M (2010) The complex field of research: For design, through design, and about design. *In Design & complexity: International conference of the Design Research Society*. Design Research Society. Retrieved from <http://www.designresearchsociety.org/docs-procs/DRS2010>.

Gardien P, Djajadiningrat T, Hummels C and Brombacher A (2014) Changing your hammer: The implications of paradigmatic innovation for design practice. *International Journal of Design*, 8(2) : 119-139.

Gaziulusoy AI and Boyle C (2013) Proposing a heuristic reflective tool for reviewing literature in transdisciplinary research for sustainability. *Journal of Cleaner Production*, 48, 139-147.

Gultekin-Atasoy P, Hooft van Huysduynen H, Lu Y, Bekker MM, Brombacher AC and Eggen, JH (2014) Conflicts as Opportunities for New Insights. *In: Proceedings of 19th DMI: Academic Design Management Conference: Design Management in an Era of Disruption, London, 2-4 September 2014* : 1323 - 1341. Design Management Institute.

Höök, K and Löwgren, J. (2012) Strong concepts: Intermediate-level knowledge in interaction design research. *ACM Transactions on Computer-Human Interaction (TOCHI)*, 19(3): 23.

Hummels C and Frens J (2008) Designing for the unknown: A design process for the future generation of highly interactive systems and products. *A Grand Day Out: Empathic Approaches to Design*.

Koskinen I, Zimmerman J, Binder T, Redstrom J and Wensveen S (2011) *Design research through practice: From the lab, field, and showroom*. Elsevier.

Megens C and Peeters M (2014) *Experiential Design Landscapes: How to design for behavior change, towards an active lifestyle*, PhD Thesis, Eindhoven University of Technology.

Rittel H and Webber M (1973) Dilemmas in a General Theory of Planning, *Policy Sciences* (4) : 155-169. Elsevier Scientific Publishing Company, Inc., Amsterdam. [Reprinted in N. Cross (ed.) (1984), *Developments in Design Methodology*, J. Wiley & Sons, Chichester :135-144.]

Schön DA (1991) *The Reflective Practitioner*, London: Maurice Temple Smith Ltd.

Sanders EBN and Stappers PJ (2008) Co-creation and the new landscapes of design. *CoDesign* 4(1): 5-18.

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Exploring the Complex: Method development by research through design

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Stappers PJ (2007) Doing design as a part of doing research. *In: Michel, R (ed.) Design Research Now: 81-91.*

Stolterman E and Wiberg M (2010) Concept-driven interaction design research. *Human-Computer Interaction, 25(2) : 95-118.*

Tieben R (2014) Unpublished doctoral thesis, Eindhoven University of Technology Department of Industrial Design.

Zimmerman J, Forlizzi J and Evenson S (2007). Research through design as a method for interaction design research in HCI. *In: Proceedings of the SIGCHI conference on Human factors in computing systems :493-502.* ACM.

Zimmerman J, Stolterman E and Forlizzi J (2010). An analysis and critique of Research through Design: towards a formalization of a research approach. *In : Proceedings of the 8th ACM Conference on Designing Interactive Systems :310-319.* ACM.