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A Designerly-Way of Conducting Qualitative Research in Design Studies

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Abstract

Design studies focuses on explaining the human activity of design, and is fundamental to design research. It frequently involves the use of qualitative research approaches such as case study, with the collection of a considerable amount of heterogeneous data (e.g. observations, interviews, documents, artifacts). Multiple sources and heterogeneous data can be hard to analyse. Within social sciences, qualitative analysis is undertaken through the process of coding (e.g. grounded theory) which can be supported by computer-assisted software such as Nvivo. However, this type of analysis works better for textual data and is not so effective to analyze more heterogeous and visual data sets. Moreover, the process of open, selective and axial coding in traditional qualitative research do not have a good fit with the more visual, iterative, and participatory approaches of service design researchers. To address these challenges this article presents a case study research, where a more visual and participatory designerly approach was used to conduct qualitative research in design studies. The results show that the approach enabled a richer data triangulation and analysis; and also triggered more multidisciplinary discussions, enriching study's results.

KEYWORDS: design research, design studies, qualitative research, service design, case study

Introduction

Design research is concerned with studying and understanding the phenomena of design (Buchanan, 2001), or with advancing knowledge useful for those who design (Manzini, 2008). Design research can include the study of the application of processes and tools in design practice (Fallman, 2008), as well as the development of new artifacts (Zimmerman, Forlizzi, & Evenson, 2007; John Zimmerman & Forlizzi, 2008). There are multiple models

of design research which pivot between subjective, constructivist or positivist epistemological perspectives (Melles & Feast, 2010), and evidences of a maturing field are emerging (Forlizzi, Zimmerman, Forlizzi, Stolterman, & Zimmerman, 2009).

Design studies is fundamental activity to design research as it aims to describe and understand design practice (Fallman, 2008). Design studies usually makes use of more traditional qualitative research approaches and methods (e.g. grounded theory) to study design. Some authors argue that design research should be closer to social sciences to enhance its rigor and validity (Collins, Joseph, & Bielaczyc, 2004; Friedman, 2003). The discussion is especially focused on the connection between problem framing, data collection and analysis, and theory construction (Forlizzi et al., 2009; Friedman, 2003), which are key research stages (Manzini, 2008). However, others explain that design research should develop tools which can better reflect the nature design: complex and messy (Stolterman, 2008). Moreover, there are still important gaps between the demands of doing design and the way theory is conceptualized (Dalsgaard, 2017; Rogers, 2004; Stolterman, 2008).

Within qualitative approaches, the research process has been well developed, from selection of cases and context of research, to data collection, analysis and theory building (Charmaz, 2014; Strauss & Corbin, 2015). Multiple computer-based softwares, currently broadly used in qualitative research, have also been developed to support data analysis with multiple evidences (e.g. Nvivo, Atlas.ti). However, these computer-assisted programs frame to some extent how the data is analysed (Hutchisona, Johnstonb, & Breckona, 2010). They seem to function better for textual data, but limit the potential for more visual and interactive learning process with multiple researchers.

Service design is a highly visual (Segelström, 2010) and participatory (Björgvinsson, Ehn, & Hillgren, 2010; Sangiorgi, Patrício, & Fisk, 2017) approach which aims to design new service solutions. Practitioners use visualizations to deal with complex design situations; organize, share, discuss and make sense of the data they collect to generate insights (Dalsgaard, 2014, 2017; Segelström, 2009; Segelström & Holmlid, 2009). Similarly, design researchers could better emphasize this way to thinking and doing into design research in order to enrich the research process and research results (Cross, 1999, 2001; Dalsgaard, 2014).

Based on the challenges presented above the present study explores how a more visual and participatory designerly approach can be used to conduct qualitative research analysis within design studies. The study offers a rich qualitative account of a design project which included 10 design teams developing new solutions with companies. The designerly approach illustrates how service design elements were infused in data collection, data analysis and report of the phenomena. The paper offers an important contribution to design research, when it comes to study and represent design practices (Fallman, 2008).

Design Research

Design research is concerned with studying and understanding the phenomena of design (Buchanan, 2001). The characteristics and theories that originate from design research approaches are still a topic that is not clear amongst design researchers, although there is evidence of a maturing field (Forlizzi et al., 2009). Different classifications exist within design research e.g. *design practice*, *design exploration* and *design studies* (Fallman, 2008); research *on* design, research *for* design and research *through* design (Forlizzi et al., 2009). These classification and schemes adopt different research processes to contribute to the field of design. While design research continues to mature (Forlizzi et al., 2009), the community still faces important challenges, especially when it comes to explicitly address the connection between problem framing, data collection and analysis, and theory construction (Forlizzi et al., 2009; Friedman, 2003; Melles & Feast, 2010). It is often argued that design research could be enhanced if combined with other social science methods and approaches to enhance its

rigor (Collins et al., 2004; Friedman, 2003). However, it is also emphasized that design research does not have to turn into an imitation of science (Cross, 1999), and new analytical method should better reflect its messy and complex nature (Stolterman, 2008).

Design Studies or research about/on design
Contrary to the other types of design research, *design studies* or research *about/on* design requires more analytical work, as the aim is to describe and understand design (Fallman, 2008), rather than creating change and/or understanding a phenomena through means of design intervention or building new artifacts (Koshinen & Krogh, 2015; Zimmerman & Forlizzi, 2008). Design studies research process usually includes the use of more traditional social science methods (e.g. interviews, observations, ethnographic-like research components) to study design processes, methods, tools that practitioners use to perform their activities (Fallman, 2008). According to Friedman (2003), Collins et al. (2004) and Dorst (2008), design research should be combined with other types of research methods, to enhance rigor and validity (Collins et al., 2004; Dorst, 2008; Friedman, 2003); and more studies within service research are increasingly combining multiple perspectives to enhance the robustness of research results e.g. (Costa et al., 2017a; Costa et al., 2017b). Stolterman (2008) and Rogers (2004) however, highlight the need to build a more in-depth understanding of designerly-ways of thinking and operating of practitioners (Stolterman, 2008), building analytical methods which may better reflect design practice (Rogers, 2004).

Qualitative research
Similarly to design studies, qualitative research is composed by an iterative process of case selection, data collection, data analysis and theory building (Charmaz, 2014; Strauss & Corbin, 2015). Gathering multiple sources of evidence (e.g. text, pictures, videos, presentations) can be a crucial part of qualitative research, which enhance internal validity (Yin, 2014). Within qualitative research, computer software (e.g. Nvivo, Atlas) is used to support data analysis. Data may include multiple types of evidence (e.g. text information, interview transcripts, audio or pictures) which are saved in the same platform. The information collected is analysed iteratively using guidelines from different qualitative research methods (e.g. grounded theory, narrative analysis). The information in the software can be classified in nodes; and memos can also be developed as the researcher reads through the different evidences, and generates theory (Strauss & Corbin, 2015). The computer's capacity can support researchers to record, sort, match and link data. However, these computer-assisted programs frame to some extent how the data is analysed (Hutchisona et al., 2010) as they limit the potential for more visual and interactive learning process with multiple researchers.

It can be difficult for design researchers to understand and analyse qualitative data with computer-aided assistive programs, which are becoming more popular in qualitative research. Design researchers should be able to rely on visualizations to gather, organize, share and discuss, and make sense of data they collect. However, these activities are lacking not very much explored within computer-assisted coding software, which can restrict the richness of results. A more encompassing and visual-based approach is then needed to enrich design research.

Service design visual and participatory approach

Service design can be interpreted as a design discipline (Kimbell, 2011), which has evolved from designing service-as-different-from-products, to a more encompassing perspective, focused on value co-creation (Patrício, Gustafsson, & Fisk, 2017; Wetter-Edman, Sangiorgi, Holmlid, Grönroos, & Mattelmäki, 2014). The visual and participatory elements (Holmlid & Evenson, 2007; Segelström & Holmlid, 2009) are core characteristics of the approach, and support the design of new services for value co-creation (Sangiorgi et al., 2017; Segelström, 2010; Segelström & Holmlid, 2009)

Visualizations (Segelström & Holmlid, 2009) and/or instruments (Dalsgaard, 2017) are used throughout the design process to support practitioners interpreting user research and communicating insights in early stages of design projects (Yu & Sangiorgi, 2017). Visualizations and instruments can be models, sketches, full-prototypes etc., which are developed and refined over the course of time and facilitate the sharing of knowledge between members of cross-functional teams (Bertoni, Panarotto, & Larsson, 2016). Segelström & Holmlid explored how service designers make sense and communicate user data through visualizations (Segelström & Holmlid, 2009). Visser et al (2005) referred to the use of visualizations in service design as mechanisms that drive knowledge transfer (e.g. personas for quick immersions, storyboards for inspiration) (Visser, Stappers, van der Lugt, & Sanders, 2005). Other methods and tools have been developed to represent new services e.g. service blueprints (Shostack, 1984), Customer Experience Modelling (Teixeira et al., 2012), Multilevel Service Design (Patrício, Fisk, e Cunha, & Constantine, 2011), and more recently other methods emerged to capture the service experience from multiple perspectives of stakeholders involved (Patrício, Pinho, Teixeira, & Fisk, 2018).

Visual representations are paramount in service design practice (Blomkvist & Segelström, 2014; Dalsgaard, 2017; Diana, Pacenti, & Tassi, 2009; Segelström & Holmlid, 2009). They are used to interpret and communicate data, substantiating design projects but this more visual and participatory components are still not explored within design studies. Moreover, a more meaningful and designerly like approach in design research could further support practitioners in reflecting upon their own practice which is becoming increasingly complex (Norman, 2010; Norman, 2010a).

Research gap
Design studies is an important area of activity of design research (Forlizzi et al., 2009), which focuses on studying the human activity of design and producing theory that describes the process of design (Fallman, 2008). Design studies can involve the use of qualitative research methods from social sciences (e.g. grounded theory, Charmaz, 2014) to undertake data collection and data analysis (Fallman, 2008). However, as the amount of complexity and heterogeneous sets of data are being collected within design studies, traditional social science qualitative methods may be limitative for design researchers.

The visual and participatory approaches are key in service design practice (Dalsgaard, 2017; Patrício et al., 2018; Segelström & Holmlid, 2009; Yu & Sangiorgi, 2017). However these components have not been explored so far in qualitative data analysis in design studies. Visual and participatory elements can improve both the analysis of increasingly complex sets of data, and could also help design researchers better deal with data analysis in design research (Bringer, Johnston, & Brachenridge, 2004; Suddaby & Suddaby, 2006). At the same time, infusing more visual and participatory elements within design studies can help design researchers describing and evolving service design practices, bringing design research closer to the demands of doing design (Stolterman, 2008).

Based on these challenges, this paper explores how a more designerly approach can better support design researchers to undertake qualitative research within design studies. The study is based on a research project which involved 10 different design teams collaborating with companies to create new solutions. The following section explains the methodology adopted namely the case selection, data collection and data analysis process.

Methodology

To better support design researchers to conduct qualitative analysis in design studies, the study follows case study research (Yin, 2014). A research project, involving the study of design practices of 10 design teams was selected. Five teams developed new solutions using

product design approach, whereas the five others developed solutions using service design approach. The main objectives of the research project were to empirically compare product design and service design approaches and explore how these approaches could be enhanced with product-service system design components (Costa et al., 2017; Costa et al., 2017).

The materials presented in the remainder of this article focus on the methodology followed to conduct the designerly qualitative research. The results and conclusions of the research case are analysed elsewhere (Costa, Patrício, Morelli, & Magee, 2017; Costa, Patrício, Morelli, & Cressy, 2017).

Case selection

The research project selected was adequate as it aimed to build new theory about design (i.e. design studies) focusing on exploring of how designers work, think, carry out their activities in two distinct design environments. The research project included the collection data through multiple research methods to build an in-depth, contextual understanding of product design and service design practices, including case study (Yin, 2014), grounded theory (Charmaz, 2014) and tenets of ethnographic research (Murchison, 2010). The complexity and richness of the dataset collected and objectives of the study, made the research project a rich ground to explore how the application of more designerly approaches to qualitative research could enhance the richness of research results in design studies.

Data Collection

The research case involved the collection of multiple sources of heterogeneous data. Gathering multiple types and sources of evidence - text, pictures, videos, presentations etc. - is a crucial part of qualitative research which enhances validity (Yin, 2014). Multiple qualitative research techniques to collect information, namely, extensive field study, observations with field notes, video recording and photographic diary to improve the reliability of the study (Voss et al., 2002). The field study was undertaken during a total of 8 months (4 months in each design context) following guidelines of ethnographic research (Murchison, 2010). Participant observation enabled the researcher to gain a deeper understanding of the design activities undertaken by the different teams. The field notes captured the current status of the projects, behaviours of participants, working environment and design activities undertaken. Field notes included rich information including thick description of the situation observed, as well as sketches representing certain moments. Additionally, eleven in-depth interviews were undertaken after the design projects ended, typically lasting between 20 to 45 minutes each. In total, a verbatim transcript of 70 pages, two diaries with field notes, physical artefacts, design review presentations and official reports were the basis of the analysis (Figure 1).
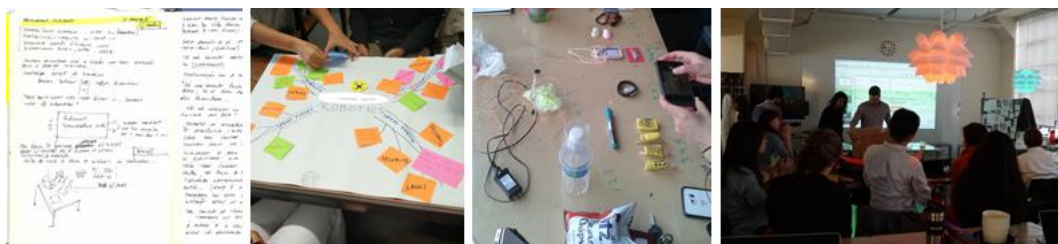

Figure 1 - Extensive field notes with annotations and sketches of specific situation occurring in context; presentations, physical artefacts and models

Data analysis

The amount of heterogeneous data (e.g. pictures, texts, narratives) presented high level of messiness and complexity which required some arrangement. To support the development of the data collection and analysis, the researcher started structuring the data by developing a full-description of the 10 design projects (Yin, 2014).

First, the data was organized by design projects and design thinking stages (Brown, 2008). The different design thinking stages (exploration, creation, test and prototype and implementation) (Johansson-Skoldberg, Woodilla, & Cetinkaya, 2013), were common between product design and service design approaches, hence they were used as an initial frame. The upper line *Px* represented design projects using product design approaches; and *Sx* represented design projects using the service design approach (Figure 2).
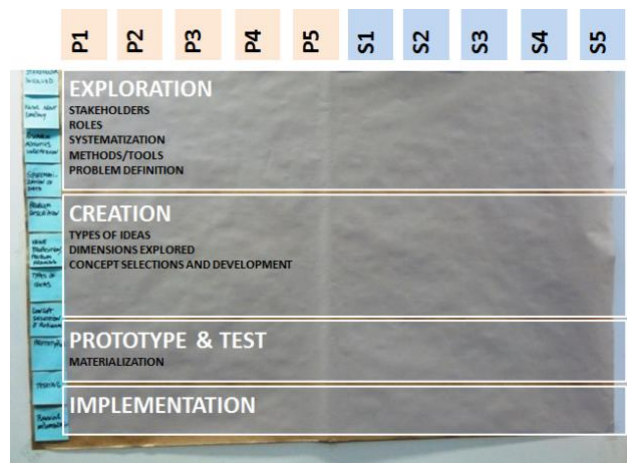

Figure 2 - canvas structured by case and design thinking stages

The development of a visual representation of the data, with different sources and types of evidence, enabled the researcher to understand which kind of data was being collected. It was useful to identify potential gaps in data collection, leading to further research (Figure 3). It also enabled the team to build preliminary insights based on the type of materials collected.
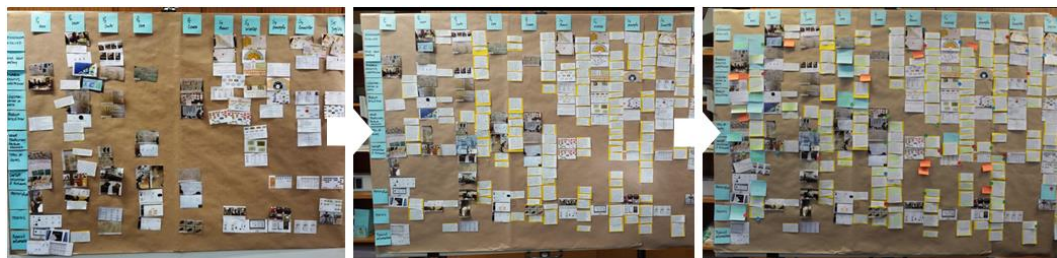

Figure 3 – data collection through time

Data collection and data analysis were intertwined activities. The canvas evolved as more data was being collected, and brought new light into new data (Figure 3). The most representative evidences – pictures from fieldwork and workshops undertaken, physical models and/or prototypes, parts of interviews– were selected and continuously displayed in the canvas in a chronological manner (Miles & Huberman, 1994). Each evidence was colour coded to keep track of the type of source (e.g. interviews were in yellow, field notes in blue, pictures in white), and the parallel representation of the different evidences facilitated the analytic analysis of the phenomena under study (Figure 4).

Figure 4 – colour codification of evidences (left); and colour codification of initial categories (service design, product design and PSS design) (right).

The representation of information resulting from this process enabled the research team to make observations cross-cutting the cases. For example, Px-projects had a tendency to materialize their thoughts in physical models and prototypes since the beginning of the process, whereas Sx-projects tended to create more abstract models, representing connections between actors. Preliminary analyses were discussed with the research team iteratively as the data collection continued to occur. The qualitative and exploratory nature of the research determined the evolution of the data analysis through time (Charmaz, 2014). The researcher's initial theoretical framework also shaped how the data was analysed. Following qualitative research guidelines (Charmaz, 2014), the researcher returned to the research questions to develop relevant insights for design research.

Given that the objectives were to understand differences between product design and service design, and understand how they would change through the infusion of a third approach (Product-Service System, PSS design), the data within each case was categorized according to their affinity to product design, service design and PSS design characteristics which were previously studied (Figure 4 and Figure 5). This first layer of coding transformed the model into a full-colour coded map through which multiple insights were developed. For example, the characteristics of each approach were not exclusive; some product design characteristics were infused in Sx-projects and vice-versa. Moreover, PSS design approach was infused more at the initial stages of the design process in Px-projects, whereas it was more evidence in latter stages of the design process in Sx-projects.
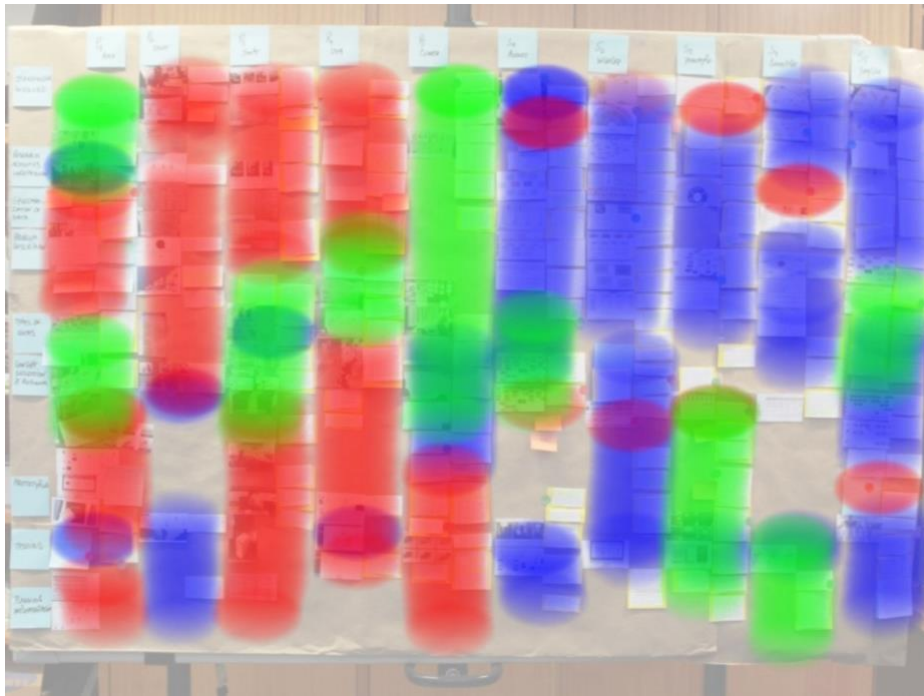
Figure 5 – visual result of colour coding by using the first layer of categories: product design, service design and PSS design

Data triangulation of the different sources of data was undertaken visually, through different colour codes (Figure 4 and Figure 5). Each case individually and then, the cross-case analysis and synthesis was undertaken. The data was analysed per design stage across the 10 cases, outlining differences and similarities between the Px and Sx design teams. The composition and analysis of the data was iterated with key informants to improve the validity of the construct (Yin, 2003).

The model supports more systematic report of the design process, and more visual, iterative and engaging analysis of data, with multiple sources of evidence. Is also enabled a more dynamic codification of data, and triggered multiple discussions with the research team.

Results of data analysis

Visual representation of data with colour coding supported the presentation and discussion process with the research team, making it more intuitive. Participatory sessions with the research team (Figure 6) as well as the meetings with the informers were key to conduct the research and construct relevant design insights. The model supported the entire analytic process and was paramount to develop the research findings. For example, it helped researchers to realize why certain Px-teams adopted service design approach components at the initial stages rather than later stages of the design process. It also triggered more discussion regarding the categorization of certain evidences. By visually observing the changes of the canvas, the research team was able to learn more from the data, and enhance the richness of results.

The main researcher was able to obtain more feedback from the research team as the story of the model and the evidences in it, was being told. The model evolved in each session, as different questions were asked, and more feedback was collected from the team members. The model then represented the current-status of the research, and was the main instrument through which researchers engaged in discussions, looking at the data through different lenses and proposing different connections between the sources, developing and connecting categories in ways that would better explain the phenomena under study.

Figure 6 – Participatory sessions with research team

The research case demonstrates how adopting more designerly approach to conduct qualitative research in design studies enhanced the research process and results. This section explained how the approach supported a more systematic report of research findings, and more systematic, iterative and visual analysis of data, with multiple sources of evidences.

Contributions

Design studies is an important area of activity of design research (Forlizzi et al., 2009) which can be enhanced (Rogers, 2004; Stolterman, 2008). A research case adopted a more designerly approach to design studies, which contributed to enrich the qualitative research process and research results. In particular, at the data collection stage, the designerly approach was used to materialize and visualize multiple types of evidence (e.g. text, images), enabling a more intuitive triangulation; and detecting missing information. At the data analysis stage the approach helped researchers triggering more collaborative and multidisciplinary discussions and enrich the results.

Relevance for design research
The designerly approach presented in this paper contributes to design research by developing a more visual and participatory analytical approach to design research, enabling a richer and more designerly description of design practice. The designerly approach answers to the call of Stolterman (2008) and Rogers (2004), regarding the need to develop new analytical tools which are closer to design lose the gap between the design practice (e.g. deal with complexity and messiness) and the way theory is conceptualized (Stolterman, 2008). The designerly approach enables more visual and intuitive data representation, enabling design researchers to identify missing information, look at data in a more visual and designerly perspective, and enabling a more intuitive triangulation of evidences. This approach also enables teams of researchers with different backgrounds to better communicate their ideas, questioning the data.

Relevance for design practice
Although the designerly approach was developed to support the qualitative research process in design studies, it can be also useful for design practitioners. The approach provides a new instrument that can bridge the gap between researchers and practitioners (Rogers, 2004), when it comes to reflect upon service design practice, evolve the approach, enhancing its rigor and richness within complexity (Norman, 2010). A more designerly approach to design studies can better connect design researchers with practitioners, bringing them closer to the qualitative research process in design studies, and facilitating a more in-depth and collaborative discussion about meaningful contributions to service design practice.

Conclusions and future research

The present article aimed to explore how to conduct qualitative research in a designerly way, in design studies. It develops a more visual and participatory designerly approach to analyse a research project with 10 design teams, and explores how it enriched the design research process. The approach enabled a more intuitive data triangulation, triggered more collaborative and multidisciplinary discussions, and enriched research results.

The research also has some limitations since the analysis is based on one research project. For future research, it would be important to understand how other design researchers conduct qualitative research, and explore how designerly approaches to design research could enrich the research process and research results. The current study could also evolve by developing a more systematic method to apply in the analysis of other research projects.

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Nina Costa, Lia Patrício, Nicola Morelli
A designerly way of conducting qualitative research in design studies
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174

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