

Cite this: Iivari, Netta, & Kuure, Leena (2024). Towards Transdisciplinary Design Research as Delicate Dance. *European Journal of Information Systems*.

Towards Transdisciplinary Design Research as a Delicate Dance

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Abstract

This study explores how design research encompassing multiple disciplines is accomplished. Such work is highly challenging. Even if information systems (IS) research generally shows an interest in reflecting on its research practice and celebrates work involving multiple disciplines as an ideal and a necessity, sufficient attention has not been paid to the challenges of such an approach or their resolution. This study introduces a situated perspective on design research entailing multiple disciplines. “Doing design research” is approached as a complex and skillful interactional accomplishment *in situ* with extensive and ongoing identity and agency articulation and negotiation. The study demonstrates that “doing design research” and “being a design researcher” with multiple disciplines involve a delicate dance. The study renews our discourse on design research and enables serious reconsideration and development of IS research methods education. The research also has implications for digitally augmenting research.

Keywords: Situated perspective; Research practice; Identity; Multidisciplinary; Interdisciplinary; Design research; Nexus analysis.

1. INTRODUCTION

This study explores how design research¹ involving multiple disciplines² is accomplished. Design research has emerged central within several disciplines and research communities in recent decades.

¹ Design research is used as an umbrella term covering developments within multiple disciplines such as design, arts, engineering, and science (see, e.g., Puro et al. 2008; Cross 2001; March & Smith 1995).

² Choi and Pak (2006: 359) discern three forms of disciplinary collaboration: 1) Multidisciplinary: Disciplines work on a problem in parallel or sequentially without challenging their boundaries; 2) Interdisciplinary: Disciplines interact with each other, their boundaries become blurred, common methodologies, perspectives, knowledge, or even new disciplines

In information systems (IS) research, design science research (DSR) has gained momentum (e.g., Hevner et al. 2004; Gregor & Hevner 2013; Peffers et al. 2018). Related developments³ have also utilized labels such as “action design research” (e.g., Sein et al. 2011) and “participatory action design research” (e.g., Bilandzic & Venable 2011; Haj-Bolouri et al. 2016). For decades, IS scholars have recognized the significance of involving multiple disciplines in research and extensive discussion on this topic is continuing (e.g., Legner et al. 2022; Sedera et al. 2017; Tarafdar & Davison 2018).

Designing digital means and tools in collaboration with multiple disciplines poses several challenges. When we design, we are imagining future worlds that go beyond our current realities (e.g., Dunne & Raby 2013; Lustig 2019; Sanders & Stappers 2014). However, design participants are occupying different realities and thus generating different imaginaries of future worlds. Participant differences increase due to diverse disciplinary backgrounds (Bergman et al. 2007; Lang 2003; Weedman 2008). Participants from different disciplines may rely on different research practices and ontological, epistemological, and methodological assumptions about current and future realities and how they can be addressed (Cummings & Kiesler 2003; Newell & Galliers 2000; Weedman 2008). The digital element complicates matters further – envisioning digital futures is not about reflecting or representing current reality but about creating and actively shaping a malleable, intangible, rapidly evolving future reality (Baskerville et al. 2020).

This study connects with and contributes to two streams of IS research: 1) the research methodological discussion and 2) the methodological design research discussion. As for the former, the research methodological IS literature does not address the need of IS researchers to collaborate with researchers representing other disciplines: There is a lack of literature reflecting on the challenges involved in such collaboration and on how to resolve these in practice. IS research should be open to this type of discussion as IS researchers have already shown interest in understanding and developing their research practice: Principles have been suggested for different kinds of research approaches, such as qualitative (e.g., Cecez-Kecmanovic 2011; Cecez-Kecmanovic et al. 2020, Klein & Myers 1999), design science (Gregor & Hevner 2013; Hevner et al. 2004) and critical research (Myers & Klein 2011). The importance of a reflexive stance towards one’s own research practice has been highlighted within qualitative and critical traditions in IS, particularly in confessional (Schultze 2000), autoethnographic (e.g., Bødker & Chamberlain 2016; Ghita 2019; Riordan 2014) and emancipatory, critical studies (Stahl et al. 2011). Discussions on our research practices as discursive practices relying on various kinds of genres and strategies (e.g., Avital et al. 2017; de Vaujany et al. 2011; Hassan et al. 2019) and embedding different values (Raman & McClelland 2019; Walsham 2012) have emerged. Such a stance to our research practices encompassing collaboration with other disciplines would offer a valuable contribution to the research methodological IS literature.

As for the latter, we are responding to the current call for research methodological discussion on design research. Although there is extensive research methodological literature on DSR (e.g., Hevner et al. 2004; Gregor & Hevner 2013; Peffers et al. 2018) and on related developments (see e.g., Bilandzic & Venable 2011; Haj-Bolouri et al. 2016; Sein et al. 2011), very little IS research has dealt with how design research involving multiple disciplines is accomplished. Nevertheless, design research is seen to be shaped and utilized by many different disciplines (Monson 2021; Peffers et al. 2007) and to need the contributions from these disciplines (Hevner et al. 2022; Labadie et al. 2022; Monson et al. 2021). This study responds to a very recent call to explore and develop transdisciplinary design research, which is characterized by wicked problems, emergent research methods and

emerge; and 3) Transdisciplinary: Scientists from different disciplines, nonscientists and other stakeholders view systems in a holistic way transcending disciplinary boundaries and transforming disciplines. This study empirically examines interdisciplinary design research including reciprocal actions and integrating knowledge, with no aim to transform disciplinary boundaries or disciplines involved. Still, the results should be generalizable to other forms.

³ These include action research (e.g., Davison et al. 2021), collaborative practice research (Mathiassen 2002), and engaged scholarship research (Mathiassen & Nielsen 2008).

extensive collaboration⁴ (Hevner et al. 2022). The emerging literature base around this topic acknowledges that challenges are to be expected in transdisciplinary design research (Legner et al. 2022), even if some solutions to these challenges have been offered (Dolata & Aleya 2022; Kuhlmaier et al. 2022; Möller et al 2022; Rajamany et al. 2022). However, this literature base lacks in-depth accounts of what transdisciplinary design research practice entails, and what being a design researcher in transdisciplinary design research projects involves. Providing such accounts should help researchers to develop stronger transdisciplinarity in their practices, in IS and beyond. IS research is among the few disciplines that make notable progress in design research and facilitate collaboration among diverse stakeholders. Hence, it should be among the forerunners in exploring research methodological questions in design research. Research within other disciplines (e.g., Giampapa 2011; Muhammad et al. 2015; Thomson & Gunter 2011) and in critical (e.g. Stahl et al. 2011) and interpretive IS research (Schultze 2000) has already indicated the value of studying and reflecting on our research practices and researcher identities and positionings. This study pursues this line of research addressing design research in IS involving multiple disciplines.

Specifically, this study addresses the following research question: *What does design research involving multiple disciplines entail: How is it performed?* We utilize nexus analysis as a theoretical lens (e.g., Scollon & Scollon 2004). Nexus analysis positions social action as the unit of analysis and approaches this as an accomplishment *in situ*,⁵ emerging as an intersection of participants with their historical bodies generating diverse interaction orders and discourses in place together (Scollon & Scollon 2004). The contribution of this study is research methodological: we introduce a framework to capture salient aspects of doing design research with multiple disciplines. The study has implications for research methodology and for digitally augmenting research, preparing IS researchers to develop their research practices in projects involving multiple disciplines.

The paper is structured as follows. Section 2 introduces related research on the topic as well as our theoretical lens. Section 3 outlines the research design of the empirical study, section 4 its results and section 5 its implications. Section 6 provides the conclusion to the paper.

2. THEORETICAL BACKGROUND

2.1. Research and Design Involving Multiple Disciplines in Information Systems

In IS research, multi-, inter- or transdisciplinary research has not received much explicit or empirical attention, nor has multi-, inter or transdisciplinary design. Outside the research context, however, there has been a long-running and vigorous debate on design involving several stakeholder groups. Originally, it emphasized the importance of user participation (e.g., Markus & Mao 2004) but, more recently, researchers have pointed out that in design, collaboration among diverse stakeholder groups from different organizations, professions, nationalities, and disciplines is often required (e.g., Bergman et al. 2007; Levina 2006; Levina & Vaast 2005; Weedman 2008). This has been recognized as the source of many kinds of collaboration challenges (e.g., Levina 2006; Lee 2007).

Among the IS studies that explicitly mention multi-, inter- or transdisciplinary research or design, most do not include empirical contributions, even though some were found. Those indicate challenges in multi-, inter- or transdisciplinary work. In the context of design, studies point out that design teams may need to engage in a great deal of discussion and negotiation to reach a common ground, as team members may utilize different languages and practices and adhere to different goals and assumptions (Bergman et al. 2007; Lang 2003; Weedman 2008). In the context of research, the studies further highlight the variety in the ontological, epistemological, and methodological assumptions held by

⁴ Please note that Hevner et al.'s (2022) characterization of transdisciplinary design research lacks transforming disciplinary boundaries, or the disciplines involved. Thus, it could also be called interdisciplinary in the sense discussed by Choi and Pak (2006).

⁵ Moment-by-moment action that takes place in a particular space and time (Scollon 2001; Scollon & Scollon 2004).

researchers from different disciplines (Cummings & Kiesler 2003; Newell & Galliers 2000; Weedman 2008).

To an extent, the design research literature in IS has acknowledged multi-, inter- or transdisciplinarity. The field is seen to derive inspiration from and contribute to many different disciplines (Purao et al. 2008; Peffers et al. 2007). Recently, design research in IS has shown interest in transdisciplinary design research (Hevner et al. 2022) but this literature base is in a very early stage, only describing some individual design research projects considered transdisciplinary from a limited perspective (e.g., Dolata & Aleya 2022; Kuhlmaier et al. 2022; Möller et al. 2022; Rajamany et al. 2022). The challenges involved are not scrutinized in detail. Nevertheless, these studies indicate that collaboration among multiple disciplines is needed in design research projects, and the community is interested in developing design research practice to support this. This study contributes to this line of research by analyzing in detail how design researchers handle collaboration between different disciplines on the micro level in order to inform further development of the practice.

This study also contributes to research methodological discussions prevailing in IS research. There are widely cited works discussing ways of conducting qualitative (e.g., Cecez-Kecmanovic 2011; Cecez-Kecmanovic et al. 2020, Klein & Myers 1999), design science (Gregor & Hevner 2013; Hevner et al. 2004), critical (Myers & Klein 2011) and design ethnographic (Baskerville & Myers 2015) research in IS. Previous studies have demonstrated that our research practice is value-laden (Raman & McClelland 2019; Walsham 2012) and discursive (Avital et al. 2017; de Vaujany et al. 2011; Hassan et al. 2019). The importance of self-reflection and a highly reflexive stance towards our research practice has been highlighted in ethnographic studies, particularly confessional (Schultze 2000) and autoethnographic ones (e.g., Bødker & Chamberlain 2016; Ghita 2019; Riordan 2014). Some reflections on researcher emancipation in critical research practice have also been reported (Stahl et al. 2011). Despite these developments, however, IS research lacks detailed, rich accounts of our research practice – particularly of design research practice and associated design researcher positionings. Methodological guidance on design research in IS underscores reciprocal shaping, mutually influential roles, authentic and concurrent evaluation, and guided emergence (Sein et al. 2011); however, this guidance does not cover reflection on research practice and on researcher positioning other than in relation to collaboration with practitioners. Collaboration among researchers representing multiple disciplines remains a blind spot. This study aims to open the black boxes of “doing design research” and “being design researchers” in the case of involving multiple disciplines.

2.2. Situated Perspective: Research and Design as Discursive and Interactional Phenomena

We approach research as a situated, interactional phenomenon. In doing so, we draw inspiration from discourse and interaction studies in disciplines beyond IS. Specifically, we rely on nexus analysis as a theoretical lens and research strategy (Scollon & Scollon 2004). Nexus analysis originates from (socio-, anthropological) linguistics, listing as its inspiration also developments in conversation analysis, variants of discourse analysis, semiotics, practice theories, and new literacy studies, among others (Scollon & de Saint-Georges 2013).

Nexus analysis highlights a situated perspective to any social action, which is to be approached at the intersection of participants’ historical bodies and the interaction orders they establish reciprocally, drawing on a range of discourses circulating in place (Scollon & Scollon 2004). Nexus analysis asks what is going on and what arises as relevant at a specific time and place, and among particular participants. These social actors bring into the situation their experiences, accustomed practices, knowledge, and skills, in other words, their historical bodies (Nishida, 1958), as well as their mutual relational configurations and interaction orders that they generate and align with *in situ* (Goffman, 1981). The concept of the historical body comes close to the concept of habitus introduced by Bourdieu (1977), while the former places emphasis particularly on how all this is embedded in individuals’ bodies. The concept of the interaction order focuses on how interaction among people is

constituted – during moment-to-moment interaction but also as shaped by societal conventions, norms, and rules used for maintaining social order (Scollon & Scollon 2004; Goffman, 1981).

Scollon and de Saint-Georges (2013: 72) argue that nexus analysis, with its situated perspective, provides a way “to avoid uprooting words and actions from the historical bodies of the individuals performing them.” As they further suggest, nexus analysis avoids “disconnecting the discourses and actions from the sociocultural context of their formation and realization, or ignoring the history of these actions and discourses for the individual and in the situation”. Hence, nexus analysis acknowledges various social and historical aspects shaping what is happening *in situ* but also what is projected for the future. Social action thus involves the simultaneity of the past, the present, and the future (Schatzki 2012: 18–19, referring to Heidegger 1927). Such a perspective to social action suggests the inseparability of the “world” and “being” in the Heideggerian (1927) way as Horrigan-Kelly et al. (2016) suggest, as the meaning of humanness resides in the co-constituted ideal of “being with others in the world.” This stance puts emphasis on the IS field re-examining the nature of its core concerns, including information, systems, and technology (Hassan et al. 2018). Inspired by nexus analysis, we approach research as social action that is constituted in interaction *in situ*, in a particular place and time, among participants who carry with them their experiences and accustomed practices and who collaboratively produce and reproduce their relational configurations.

Although nexus-analytic studies have not scrutinized the domain of our interest to date, we could locate related studies within other disciplines, in which in-depth inquiries into design or research practices have been carried out. These studies illustrate how they are accomplished in interaction and how the participants with their backgrounds are shaping it. Particularly the practice of design has been explored *in situ*: a tradition in design research has focused on the situated aspects of design, exploring what is going on, who the participants are, and what arises as relevant interactionally. In addition, there is literature on researcher and designer identity and positioning, highlighting research and design as interactional and discursive phenomena. Next, we discuss insights from these literature bases.

As for the practice of design, attention has been directed to the quality of collaboration *in situ*. Studies have revealed the micro-level details of such collaboration. For example, the ideal of equal participation may be compromised by participants’ desire to avoid disagreement and to maintain the progress of the activity they are engaged in. In other words, team members may focus on maintaining interactional harmony rather than ensuring that everybody’s voice is heard in the design process (Heinemann et al. 2012). Further, pointing may constitute a practice for reestablishing intersubjectivity and solving interactional trouble (Donovan et al. 2011). The delicate treatment of design options has been examined as an interactional achievement (Matthews & Heinemann, 2012). Designers’ and clients’ conversational exchanges have been shown to demonstrate how participants draw on their own territories of expertise, each advancing the design progression, while at times incidents arise provoking more complex exchanges (McDonnell, 2009). Design participants may draw on different resources with different values and ideals. An analysis of language and discourse in relation to design has revealed how different contributors to a project portray objects of design in a different light (Franklin, 2001). In design meetings, misunderstandings may occur throughout the interaction, although not as clearly discernible events, which means that the disambiguation of problem-solving may become difficult (Luck, 2013). Designers’ identities, roles, goals, and knowledge have been shown to influence joint remembering sequences that connect multiple timescales and facilitate the planning of future actions and decision-making during collaborative design (Bietti et al. 2016). Discursively constructed new collaborative spaces may also emerge along the way (Birch et al. 2017).

Regarding researcher and designer identities and positioning, some studies have suggested that research and design entail participants’ constant positioning, reflection, and identity work vis-à-vis others. Participants produce themselves and each other interactionally and discursively through

different categories. Categories such as “architect” and “client” are performed in design meetings and talked into being (Heritage 1984; Oak 2009); thus, the participants arrive at a concrete result, but they also create and perpetuate the customs, attitudes, beliefs, and behaviors that form and inform the social practice of design (Oak 2009). Positioning theory (Davies & Harré 1990) has been used to examine identities and mutual relationships between participants in design – how people discursively place themselves but also others in an entanglement of relationships. The participants are seen to constantly take a stance regarding others, in other words, assuming and ascribing positions (Stuhlfauth et al. 2019). This has even been referred to as “discursive dance” (Aiello & Nero 2019). Researcher identity is seen as constantly negotiated in relation to and in collaboration with research participants (Giampapa 2011; Muhammad et al. 2015; Thomson & Gunter 2011). Researcher identities are seen as fluid (Thomson & Gunter 2011) and shifting (Giampapa 2011), and the process as heavily power laden: Researcher identity/power and positionality shape the research outcomes and process (Muhammad et al. 2015). In research practice, multiple discourses are produced and reproduced, and among them, research can be seen as a “delicate dance” (Giampapa 2011).

2.3. Analytic Focus in Design Research as Social Action: Identity and Agency

Interaction- and discourse-oriented studies, along with the nexus-analytic approach, suggest examining design research as a phenomenon accomplished interactionally *in situ* – as social action emerging due to the interaction of the historical bodies of the participants, interaction orders among them, and discourses in place circulating around (Scollon & Scollon 2004). This study empirically taps into two aspects of interaction order and historical bodies as intertwined in the social action of design research: Design researcher identity and agency.

“Identity” is a complex concept with multiple definitions and associated traditions. It has attracted significant attention in IS research (e.g., Carter & Grover 2015; Riemenschneider & Armstrong 2021; Schultze 2014). The situational, relational, and performative perspective to identity adopted in this study builds on the vast body of literature discussing individual, self-, social or collective identity as developing and being produced in interaction with others, evident in psychology, sociology, linguistics, and organizational, media, interaction, and discourse studies, among others (e.g., Alvesson 2010; Ashmore et al. 2004; Buckingham 2008; Norris 2011; Stryker 2008). The situational, processual view of identity is specifically discussed in studies with critical, multimodal, and discourse perspectives (e.g., Norris 2011). This view highlights people’s identity work as making sense of “who they are and where they belong” although this is always “a limited and temporary fixing of particular modes of subjectivity” (Weedon 2004: 19). Identities are thus not to be viewed as static properties of people but rather as processes; they are constantly being explored, negotiated, produced, and performed in interaction (Buckingham 2008; Norris 2011; Schultze 2014; Scollon & Scollon 2004; Weedon 1987, 2004). Situatedness refers to some aspects of identities, particular modes of subjectivity, becoming relevant or drawn on in specific situations, with specific participants. Identities are, thus, fluid, malleable, and in constant flux (Buckingham 2008; Schultze 2014; Weedon 1987, 2004). In line with this, we see the design researcher identity as referring to the specific modes of subjectivity produced during design research interaction.

Agency is also a complex concept with multiple definitions and traditions (Emirbayer & Mische 1998), already discussed in IS research, both from the viewpoint of human and technological agency (e.g., Andrade & Doolin 2016; Chu & Robey 2008; Cecez-Kecmanovic et al. 2014; Leonardi 2011). Agency is seen as the socially mediated capacity to act (Ahearn 2001). We approach agency as situational, relational, performative, as well as inventive and reflective (Emirbayer & Mische 1998). It is viewed as a process rather than a property: It refers to a collective, “continuous, non-linear and tension-laden process, always related to the socio-material context and practical actions” (Kajamaa & Kumpulainen 2019: 267), which entails seeing the world as changeable, as “imagining alternative futures is at the heart of agency” (Rajala et al. 2013: 119, citing Emirbayer and Mische 1998; Rainio 2010). The nexus-analytic perspective takes agency further, seeing it as distributed socially,

culturally, and historically, in terms of the social actors' historical bodies, the actors' mutual power configurations, and discourses circulating in interactions with different scales of time and place (Scollon & Scollon 2004).

We wish to highlight the interrelations between the notions of identity and agency. In the nexus-analytic approach, identity and agency are seen as embedded in all actions that people perform (Scollon & Scollon, 2004). Scollon (2001) relates social action to agency, stating that "there is no action (agency) without some mediational means (i.e., the semiotic/material means of communicating the action) and there is no mediational means without a social actor (agency)." While engaging in social action, social actors continuously position themselves in relation to others, at the same time inviting positioning by others (Davies & Harré 1990). Identities can be seen as ways of relating the self to the world, accomplished through cycles of perception, action, and interpretation, drawing on various resources available (Van Lier 2007). As participants are involved in continuous identity work, they also engage in positioning in terms of their and others' agency (Scollon & Scollon 2004; Van Lier 2007). The temporal aspect related to both identity and agency is highlighted. Identities are not only built on people's experiences of the past but involve their present actions and future projections, being constantly under construction and subject to change (Van Lier 2007). It is similarly highlighted that agency is "informed by the past (in its habitual aspect), but also oriented toward the future (as a capacity to imagine alternative possibilities) and toward the present (as a capacity to contextualize past habits and future projects within the contingencies of the moment)" (Emirbayer & Mische 1998: 963).

3. RESEARCH DESIGN

In the examination of how design research involving different disciplines is performed, this paper relies on data generated through a nexus-analytic inquiry (Scollon & Scollon 2004) on a research project developing a mobile learning application designed to serve the learning needs of individual learners, learner communities, and classroom practice. Nexus analysis not only provides this study with a theoretical lens but also a research strategy: Nexus analysis guides the research process to include three cycles, namely, engaging, navigating, and changing (Scollon & Scollon 2004). First, it is important for the researcher to establish a zone of identification, for example, by becoming an acknowledged participant in the community under study (engaging). Thereafter, the researcher navigates the answers to the research questions by using different methods of data collection and analysis; ethnography, as well as discourse and interaction analysis are commonly used. Nexus analysis is, however, methodologically flexible regarding data collection and analysis as it aims to shed light on both details and the whole, zooming in and out of the nexus being investigated. Finally, nexus analysis underscores that researchers inevitably contribute to change through the research process, while it is also possible to advocate change that is relevant for the community in question in a participatory manner.

As can be seen from the above, nexus analysis has similarities with several qualitative research approaches utilized in IS research, such as ethnographic methods (e.g., Baskerville & Myers 2015; Schultze 2000), action research and related developments (e.g., Davison et al. 2021; Mathiassen 2002; Mathiassen & Nielsen 2008), and discourse and interaction analysis methods (e.g., Hur et al. 2019; Schultze & Brooks 2019). We consider nexus analysis suitable for our study because it allows for combining both qualitative and participatory approaches. It also guides the researcher to a micro-level analysis of the social action in question while at the same time acknowledging the myriad of social and historical aspects involved, going beyond the here and now (Scollon & Scollon 2004).

In our study, the three cycles of nexus analysis are involved in the following way: The first author of this paper was a member of the core group of project actors who participated in writing the project application and was actively engaged in the project, whereas more junior researchers implemented

most of the work. Engaging with the community under study was central to this study, and the first author of the paper can be considered an “involved researcher” who had a direct personal stake in the outcomes of the project and gained insider insight into the project (Walsham 1995). Navigation in this study included collecting and analyzing data from online interaction, loosely following ethnographic observation as well as the study of interaction and discourse (Scollon & Scollon 2004). Participation in the social action under study as well as contributing to its change formed an integral part of the research process. The first author acted both as a participant and an observer in the design research project: She had a voice in the design research discussions, but due to her managerial and supervisory positions, she remained relatively silent. The second author joined the study process at a later stage (see below), engaging in the research due to having experience of multidisciplinary collaboration and of researching discursive and interactional aspects of teamwork in other contexts.

The project in question enables scrutinizing interdisciplinary design research as it emerges and unfolds. The project involves collaboration among researchers representing several disciplines, countries, and organizations, including two Information Technology (IT) companies and six research institutions with expertise in IT, human–computer interaction/information systems (HCI/IS), and educational sciences (ES), all engaging in the design of a mobile learning application. From each organization, a couple of core members actively and regularly participated in the project, while in some of them, dozens of more junior staff contributed to the work during a shorter time span or irregularly: One can identify a core group of five ES specialists, six HCI/IS specialists, and five IT specialists leading the work in the project and accomplishing the interdisciplinary work (nine women, seven men, representing three countries). An ES specialist acted as the project manager of the project. The work was structured into work packages with nominated leaders. A couple of ES specialists ideated the project based on their research interests around augmenting learning with mobile technology. The IT specialists’ and HCI/IS specialists’ research interests relate to experimenting with advanced IT, to developing processes around its development, or to inviting users to participate more genuinely in its development.

The research data involved in this study consist of the digital documentation generated during the design phase of the project. These data are particularly suitable to study how interdisciplinary design research emerges and unfolds as this was a distributed project in which the work was carried out remotely and captured in digital documentation. In distributed projects, collaborative design takes place within three digital spaces: the discussion space composed of mailing lists, discussion forums, and other types of communication tools; the documentation space containing project-related documentation; and the implementation space including the project’s source code, usually accessible through a version control system (Sack et al. 2006). The present study examines the material generated during the design, which is captured in the discussion and documentation spaces of the project, that is, in the mailing lists and a shared data repository. The project participants produced this material collaboratively over a year and a half, including a five-month period of preparatory work before the project officially started and one year and two months of project work consisting of ideation, requirements specification, and design (see Table 1). This period included two physical meetings; otherwise, all work was done remotely. Most of the communication took place via the mailing lists, in which the core group participated and performed interdisciplinary design research. A couple of online meetings were also organized, based on which memos were written and stored in the shared data repository. The research material included in this study consists of digital documentation on the requirements or design of the mobile learning application (around 500 files): The project plan (1), formal project deliverables (on requirements or design, addressing pedagogical, usability, or technical requirements or design – 16 documents), different kinds of informal documents (e.g., memos, drafts of the formal deliverables, sketches, drawings – 96 documents), and emails using the project mailing lists and addressing requirements or design (404 documents). The study followed the ethics guidelines and criteria of the National Agency for Research Integrity. The study participants were asked for their informed consent.

Table 1. Analyzed Timeline

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Ideation	H1, 2, 3, I1, 2, 3, E1, 2, 3, 4, 5	H1, 2, 3, I1, 2, 3, E1, 2, 3, 4, 5	H1, 2, 3, I1, 2, 3, E1, 2, 3, 4, 5	H1, 2, 3, I1, 2, 3, E1, 2, 3, 4, 5										
Requirements specification				H1, 2, 3, 4, I1, 2, 3, E1, 2, 3, 4, 5	H1, 2, 3, 4, I1, 2, 3, E1, 2, 3, 4, 5	H1, 2, 3, 4, I1, 2, 3, 4, 5, E1, 2, 3, 4, 5	H1, 2, 3, 4, 5, 6, I1, 2, 3, 4, 5, E1, 2, 3, 4, 5	H1, 2, 3, 4, 5, 6, I1, 2, 3, 4, 5, E1, 2, 3, 4, 5	H1, 2, 3, 4, 5, 6, I1, 2, 3, 4, 5, E1, 2, 3, 4, 5					
Design							H1, 2, 3, 4, 5, 6, I1, 2, 3, 4, 5, E1, 2, 3, 4, 5	H1, 2, 3, 4, 5, 6, I1, 2, 3, 4, 5, E1, 2, 3, 4, 5	H1, 2, 3, 4, 5, 6, I1, 2, 3, 4, 5, E1, 2, 3, 4, 5	H1, 2, 3, 4, 5, 6, I1, 2, 3, 4, 5, E1, 2, 3, 4, 5	H1, 2, 3, 4, 5, 6, I1, 2, 3, 4, 5, E1, 2, 3, 4, 5	H1, 2, 3, 4, 5, 6, I1, 2, 3, 4, 5, E1, 2, 3, 4, 5	H1, 2, 3, 4, 5, 6, I1, 2, 3, 4, 5, E1, 2, 3, 4, 5	H1, 2, 3, 4, 5, 6, I1, 2, 3, 4, 5, E1, 2, 3, 4, 5

H=nr of Human Computer specialists, I=nr of Information Technology specialists, E=nr of Educational Science specialists

The data analysis proceeded in four phases:

The first phase involved screening the overall dataset and selecting the data relevant from the perspective of design research (excluding documents unrelated to requirements or design).

Second, a chronological outline of the project events was developed: This phase identified the main events and participants related to accomplishing the design research. All texts considered to address requirements or design were saved in a single lengthy document (around 150 pages with around 50,000 words). These texts were read and categorized during several rounds in a data-driven manner. The evolving process considered, for each snippet of text, who said or did what, how, when, where, and why, characterizing the evolving design research process. During this phase, the technique of member checking (e.g., Iivari 2018) was utilized: A case study write-up was delivered to the project participants for comments, corrections were made based on their feedback, and some direct citations were removed following the request of a participant.

Third, the analysis concentrated on the collaboration among different disciplines: The existing literature was utilized as a sensitizing device, and the dataset created in stage two was examined from the perspective of whether the different disciplines were contributing relatively independently – in parallel or sequentially, whether they were addressing shared problems and integrating their contributions, and whether they were transcending disciplinary boundaries and transforming the disciplines (Choi & Pak 2006; Stock & Burton 2011). During this phase it was determined that, from the outset, the project expected mainly multidisciplinary research (e.g., having mostly separate deliverables for different disciplines). Occasionally, however, interdisciplinary collaboration emerged. Either the project plan required contributions from different disciplines to particular deliverables, or the participants spontaneously initiated collaboration and integrated their contributions in the project discussion space. All instances of interdisciplinary collaboration were collected into one document to analyze how interdisciplinary design research was performed.

Fourth, the situated perspective was utilized to make sense of the data. Here the second author entered the data analysis process. The analysis was sensitized towards how design research and being a design researcher were performed *in situ*: what those entailed, what emerged as relevant, and what kinds of resources were drawn upon. Guidance from interaction and discourse analysis (Scollon & Scollon 2004) was followed, and the *in-situ* interaction among the participants was examined. Attention was paid to how the participants dealt with aspects of collaboration and sharing expertise. Linguistic aspects were considered (e.g., word choice) but also how the participants were discursively building collaboration (e.g., by verbally legitimizing certain ways of doing things, giving positive feedback on others' actions, and positioning certain courses of action as normal or different). The concepts of interaction order and historical body were used as sensitizing devices (Scollon & Scollon 2004): The analytic focus was on how the histories, expertise, and experiences of the participants shaped the *in-situ* interactions and what kinds of mutual relational configurations were formed *in situ*. This analysis revealed two aspects and activities occurring repeatedly while doing design research and being a

design researcher: Articulation and negotiation of identity (relating to the historical body in particular) and articulation and negotiation of agency (relating to the interaction order in particular). The analysis ended up as characterizing these performances in interdisciplinary design research.

Regarding positionality and analytic distance, the first author (an HCI/IS specialist) conducted the initial analysis, with her background naturally shaping her interpretations (see, e.g., Klein & Myers 1999), while she deliberately sought analytic distance for the HCI/IS specialists' texts to treat all texts in an equally "detached" manner – as far as it is ever possible to remain detached. She also relied on member checking (see, e.g., Iivari 2018) to engage the study participants in the joint interpretation of the project happenings. The IT specialists' and educational science specialists' texts were quite "alien" to her, while the second author, who has a background in linguistics and discourse and interaction studies, was able to approach all the texts as equally alien. The second author was only involved in the fourth phase of the analysis. The value of her background became evident as she was able to shed entirely new light on the data and on the *in-situ* interactions. The two authors engaged in extensive discussions on the second author's interpretations that the first author related to, negotiated, and occasionally challenged based on her personal and contextual understanding.

4. PERFORMING INTERDISCIPLINARY DESIGN RESEARCH

The analysis revealed that identity and agency were constantly articulated and negotiated during design research, as performed by specialists representing different disciplines such as ES, HCI/IS and IT. The analysis showed that in design research, the participants' articulation and negotiation of their historical bodies (particularly as captured in design-researcher identity) and interactions (particularly as captured in design-researcher agency) significantly impacted the evolution and advancement of the project.

4.1. Articulating and negotiating the design-researcher identity

In work involving different disciplines, the participants strive to make their expertise and contributions to the common goal clear to the others. Professionals in all disciplines accumulate experience and understanding, and they establish practices that become part of their historical bodies. In this study, in their exchanges, the participants' historical bodies could occasionally be seen (articulating their design-researcher identities) when they articulated their expertise and stance on design research, which affected how they imagined digital futures. These articulations could be seen over the whole period analyzed, not only at the beginning, indicating that these identities are continually performed.

These articulations could be seen, for instance, when the HCI/IS specialists contributed to discussions with their method repertoire from HCI/IS, demonstrating their historical bodies. The HCI/IS specialists articulated that users and user data were drivers of their design, i.e., a basis for their imaginings. In their emails to the other project participants, they described their plans for user sessions as aimed at specifying requirements, conducting iterative evaluations and user interface design:

We have decided the following tasks: Expert usability evaluation of the application. (. . .) Requirements definition/design sessions together with users (. . .) Empirical usability testing of the application together with users (. . .) User interface design (. . .) Evaluation and iteration of t

By using jargon not necessarily familiar to participants from other disciplines (requirements specification, design sessions, user interface design, evaluation, iteration), the HCI/IS specialists foregrounded and legitimised their discipline-specific expertise in the design of digital futures.

Historical bodies were also articulated when the ES specialists outlined the requirements for the application from the viewpoint of learning and development, i.e., the basis of their imagined digital futures. Scientific references (e.g., to Vygotsky) were used to back up their claims and, by using those, the ES specialists also positioned themselves as researchers, thus legitimising their design-

researcher agency to envision the digital futures for learning and development (see also section 4.2). For colleagues in the same discipline, they would not have needed to explicate these references as they would have held a shared knowledge base on this matter.

Articulating design-researcher identities may also entail articulating what is not known, i.e., lack of expertise, as the below request for clarification from an ES specialist shows, for example:

Can you check the attached description taking into account our discussion on Thursday? Have I understood correctly what will be done with the previous version before EduMo and that EduMo functionality is described correctly? I have tried to integrate into the text our discussion at the level of detail a humanist can describe these things. (ES)

In the example, an ES specialist articulates their limited historical body in the field of design of digital futures as potentially hindering their participation in the joint venture and invites the others to provide confirmation before going further in the process. The ES specialist highlights their intention to align with the practices considered standard in the IT field and do what is expected (*I have tried*) according to the historical bodies of other participants. The invitation is combined with a reference to their potential limitations as representatives of another discipline (*at the level of detail a humanist can describe these things*). Here, a particular mode of subjectivity in design research is expressed as well as challenges involved in addressing the digital component in design.

The IT specialists equally engaged in articulating their disciplinary expertise, and their lack thereof, demarcating design of the digital futures as an area of theirs as well as the others':

I think educators should try to do their best, and we (software designers) will just guess the rest then – as we have already done. (. . .) It is natural that [IT specialists] have only some non-educated (!) thoughts about learning and development. (. . .) I could also list many technical challenges to solve, and many architectural level and detailed things to design. (. . .) we will not bother you with module division, class diagrams, and other underlying software implementation specific design details. (IT)

This example makes clear how, in addition to articulating their own historical bodies, the project participants also engaged in delicate articulation, negotiation and anticipation of the expertise of others, laying the grounds for their emerging interaction orders (see section 4.2).

This delicate articulation of the expertise of others is further illustrated by an example where an IT specialist initiated an exchange with others on the project mailing list, asking for elaboration on user requirements related to the design of a particular feature for the learning application:

Brief: How many files a user can save? Long: Technically thousands (. . .). But how can the user manage (. . .) them? (IT)

The IT specialist began the exchange with a question, which was then elaborated on by providing some technical background (*Technically thousands*), followed by framing the initial question in context. The IT specialist's breakdown of the question into the "brief" and the "long" can be interpreted as a consideration of two different audiences with differing disciplinary expertise. The initial question was sufficient for the specialists in the same field, while the representatives of other fields would not have been able to understand the question without the elaborated context. Thus, the entry indicates the delicate configuration of interaction orders between participants when their experience and knowledge (i.e., historical bodies) in relation to some topics are assumed to be shared, while they are not for others. Furthermore, in this case, the IT specialist's note reveals an awareness and anticipation of potential problems and strategies to overcome those for the process to advance.

After the IT specialist voiced the issue in question (*But how can the user manage . . .*), an ES specialist stepped in with the following thoughts and direction:

This question is interesting. It belongs to the research field of [HCI/IS specialist] (. . .). As researchers, we need them ALL (ES)

Here, the ES specialist started with an evaluation (*This question is interesting*), but transferred the responsibility for its solution beyond their own field, specifically to HCI/IS. This was supported by

their articulation of familiarity with the other involved disciplines, which readied them to direct the inquiry to a suitable expert. The ES specialist also positioned the team members as researchers (*As researchers, we need them ALL*), voicing a particular stance to design research. Additionally, they communicated that all files were important, which was stressed multimodally (Van Leeuwen, 2004), i.e., through lexical choice (*we need*) and capital letters (*ALL*)

In their reply, an HCI/IS specialist agreed with the interpretation of the question as belonging to their area of expertise. Their historical body in the sense of design-researcher identity was articulated in their reply, which elaborated on the topic of user data as an essential basis for design, as well as communicated that working with users was standard for them (*We should organize a session with users*):

We should organize a session with users (. . .) to see how many they make during (. . .) a session. (. . .) Different versions (. . .) can be a nightmare! (. . .) One has to code (. . .). This seems to be a logical problem that needs to be solved. (HCI/IS)

The post also included expressions through which the HCI/IS specialist articulated some familiarity with the field of IT design, and a certain subjectivity related to that, pointing out the issue of keeping track of versions as a part of the programming process. The HCI/IS specialist expressed familiarity with the others' concerns and adopted a worried tone, anticipating potential problems for those whose responsibility was to "code" (*can be a nightmare!*). This was highlighted through several multimodal resources (Van Leeuwen, 2004) such as the use of an exclamation mark as well as an expressive metaphor (*nightmare*). Although the HCI/IS specialist was not responsible for coding, their utterances indicated compassion and affinity with those whose responsibility it was, along with knowledge about the challenges associated with their responsibilities, contributing to the configuration of their interaction orders (see section 4.2).

The participants also collaboratively articulated and celebrated the nature of interdisciplinary work, incorporating varying kinds of design research expertise, thereby setting the grounds for a balanced configuration of historical bodies. In the following example, an ES specialist thanked an HCI/IS specialist for their valuable input when solving a requirement/specification-related problem:

The comments are very helpful and a reminder to us that research is an iterative process. The challenge of the work package model is the assumption that knowledge can be compartmentalized (. . .). However, we should remember that the research activity is an evaluation of our approach as well as our products. Your detailed commentary from your specialized perspective is invaluable. It is also a good illustration that we have wonderful expertise between the team members and that we should continue to seek ways to join this up. Our great strength is that we are a multi-disciplinary, multi-national team. This implies that we need time to share and talk as well as to be specialists. (ES)

In offering their appreciation (*many thanks, helpful*), the ES specialist put forward some specific views about the iterative nature of research and knowledge as something more than distinguishable entities (*compartmentalized*). The interlocutor and the team were appraised positively (*detailed commentary, invaluable, wonderful expertise, great strength*). Thus, the discussion was important from the perspective of articulating, celebrating, and renewing the historical bodies of the individuals participating in this design research project, which involved continual negotiations and boundary-making around the design-researcher identities of the specialists involved. The abundant praise also referenced how the participants came from different disciplines, where a particular procedure to accomplish design was a regular practice for some participants but quite novel for others. On the contrary, if both participants had a shared background in this practice, such feedback might have been excessive.

4.2. Articulating and negotiating design-researcher agency

Some of the examples discussed above reveal careful balancing of interaction orders among the participants in the sense of articulating and negotiating their agency. These efforts were continual, rather than specific to any particular phase of the project, even though progress from articulation to

questioning and negotiation of agency among the participants could be identified, as well as HCI/IS specialists' stronger articulations of their agency compared to the others.

Returning to the exemplar post from an ES specialist on how many files to save, this illustrates the delicate work of articulating and negotiating design-researcher agency:

This question is interesting. It belongs to the research field of [HCI/IS specialist] (. . .). As researchers, we need them ALL. (. . .). I suggest the following: (. . .). Is this sensible, feasible? (ES)

Although the ES specialist's post included some hedging in terms of their agency in design (the use of suggest; invitation for the reader to consider if the suggestion was sensible, feasible), it also reflected strong agency in suggesting what kind of digital solution to design through declarative expressions (*we need them ALL; I suggest the following*). A direct question (*Is this sensible . . .*) also indicated the ES specialist's agency in the design process, while taking responsibility for its pace, through a straightforward invitation to give an answer. In this way, the ES specialist also assigned expertise and agency to others and, at the same time, voiced the spirit of collaboration in this interdisciplinary venture, alongside configuring the interaction orders among the project partners. These could be seen as moves to mitigate potential tensions between participants, thus contributing to a balanced interaction order in their teamwork.

Overall, the participants' exchanges demonstrated continual and cautious articulation and negotiation of design-researcher agency, i.e., an appropriate interaction order for the design process. Another example, below, shows how an HCI/IS specialist initiated a discussion on the functionality of the learning application in the project mailing list.

We are planning of moving [a feature] to the advanced version. (...) Comments? (HCI/IS)

This extract shows how the HCI/IS specialists **articulate strong agency in design**: they assume authority through a proposal to *move* a function, although allowing other experts to *comment*. An ES specialist answered the HCI/IS specialist's inquiry with a question as follows:

Would it be possible to decide after piloting? (ES)

The ES specialist's question suggested an alternative course of action but also uncertainty about making decisions in this phase. An IT specialist entered the discussion as follows:

We naturally experiment with as many alternatives as possible, as this is a research project. (...) [HCI/IS specialists] have experiences with users on this. I second [the feature moved] to the advanced version. (IT)

The IT specialist emphasised the significance of research as driving and shaping the design process. In this case, both participants legitimised an open approach by referring to the research context as entailing "piloting" and "experimenting." The IT specialist also underscored the importance of user insights and noted the HCI/IS specialists' expertise in user research, hence providing support for their agency in making the decision in question (*I second . . .*). Thus, the quote shows the specialists forming relations and articulating and negotiating agency in relation to one another, particularly with the IT specialist showing an affinity and appreciation for the HCI/IS specialists' work with users. An HCI/IS specialist then seconded the IT specialist's view, confirming the importance of user insights as the basis for their design suggestion:

For your information: we tested the feature already with users. (. . .) It was confusing for them. This is our opinion. (HCI/IS)

This quote of the HCI/IS specialist shows how ingrained the practice of conducting user research is in the tradition of the discipline and in their historical bodies (see also section 4.1.). User tests had already been conducted and supported the specialists to draw conclusions about the feature. The HCI/IS specialists had proceeded to action quickly, considering it a standard procedure. They assumed strong agency in this respect, ignoring possible alternative courses of action. This was not

necessarily a conscious act, and instead shows how certain practices may be deep-rooted in participants' historical bodies.

As regards collaboration with other disciplines, the HCI/IS specialists were explicit in their appreciation of the ES specialists' design-researcher agency:

In the [requirements specification created by the HCI/IS specialists] the scenarios by [educational science specialists] need to be included (as a basis of the HCI/IS specialists' design). (HCI/IS)

In acknowledging the importance of the educational science perspective as driving the design, they engaged in interactional work to help balance the interaction order among the participants.

However, there were also cases in which the specialists could be seen to be negotiating if not even questioning others' agency, as in an HCI/IS specialist's post directed to the ES specialists:

[Requirements] produce information on what will be implemented, but you [ES specialists] do not need to design the user interface. So, there just needs to be the information, in one form or another, on what needs to be available; we will produce the user interface design. (HCI/IS).

In the discussion, the HCI/IS specialists tried to demarcate design as their area of expertise, indicating to the ES specialists that they should only be concerned with the requirements for the future digital solution, rather than engaging in its design. The extract is exemplary of the negotiation of expertise and division of work, identity, and agency among the team members. This included negotiating whose customary practices or standard procedures are followed, or whether new configurations of responsibilities, and hence, interaction orders, should be trialed. There was a discussion around whether user data should drive design:

We are wondering here together with [an HCI/IS specialist] why the user interfaces have been created anew and our results from the project during spring have been ignored? (...) Now it seems that our feedback is ignored but instead the work has continued based on the own scenarios... I would say that we should prioritize the designs that have already been evaluated. (HCI/IS)

This example shows there was some debate about which basis to follow in imagining and specifying the digital future. The example also reveals that the design process, articulated on several occasions and through different communicative means as standard, had not been followed. This situation had arisen since such practice was not standard for the ES specialists. The criticism presented in the HCI/IS specialist's entry referred to a collective feeling (*We are wondering here together*) and was presented directly (*our feedback is ignored*), and the HCI/IS specialist legitimized this critique by appealing to their standard procedure (*we should prioritize the designs that have already been evaluated*) as embedded in their historical body. The ES specialists were the target of the critique. However, the accusation was mitigated by using passive voice and avoiding mentioning them explicitly (*have been created anew; have been ignored*), although the area of responsibility was mentioned (*scenarios*), making it clear who had not followed the standard procedure. Through negotiation over whose procedure to follow, the example illustrates the implicit disciplinary contest that was taking place over agency. An ES specialist answered:

[An ES specialist institution] has tried their best to finalize the design from the pedagogical point of view. Still, there are open questions on it from the UI point of view as well. (ES)

The ES specialist affirmed their commitment to the joint interdisciplinary venture (*has tried their best*) and legitimized their working method, appealing to their disciplinary expertise (*pedagogical point of view*), though they mitigated this by admitting there were still unsolved problems. In this way, interactional work was carried out to move toward a solution that pleased the participants. At the same time, the participants competed for agency over whose practices were followed and whether new practices would be drawn up, showing their historical bodies and interaction orders were in flux.

Many exchanges also showed how the participants collaboratively articulated and negotiated each other's agency when envisioning digital futures among multiple disciplines:

My opinion is that we should utilize each partner's expertise as much as possible. Thus, educators should concentrate on educational aspects (learners, educational aims, procedures etc.) and software designers should concentrate on software design from technical viewpoint. In addition, there exists separate knowledge on users produced as part of the usability work. (ES)

I think we should co-operate more and try to produce some design documents that are grounded on educators' knowledge and coated with technical details. (IT)

The extracts articulate understanding of how collaboration between different disciplines is best accomplished. The ES specialist's comment highlighted collaboration as strongest when specialists concentrate on what they do best, while the IT specialist's interpretation placed more emphasis on synergy and an incremental approach (*grounded on educators' knowledge, coated with technical details*). Overall, these discussions show the interactional work carried out by the participants in relating to one another, renewing their historical bodies, and delicately negotiating meanings in order to establish a balanced interaction order between the team members. The discussions also reveal how careful efforts were made to configure identity and agency throughout the collaboration among multiple disciplines.

5. DISCUSSION

5.1. Summary of the results

This study explored how design research with multiple disciplines is accomplished, that is, how doing design research and being a design-researcher are performed. The study revealed design research involving multiple disciplines as a complex, skillful interactional accomplishment *in situ*. In the process, participants articulate and negotiate their and others' design-researcher identities and agencies, which relate to their disciplinary expertise and stances on research, design, and collaboration. The analysis showed that design research requires delicate interactional work on forming alliances, expressing affinity and compassion, and celebrating collaboration. The participants positioned themselves and the others in relation to the task at hand, for instance, by inviting others to participate, laying the grounds for others to contribute and weaving others' contributions carefully into the joint endeavor. All this took place digitally in the project discussion and documentation spaces, facilitated by basic tools such as a shared data repository and project mailing list.

Based on our findings, we theorize design research as social action entailing extensive articulation and negotiation of one's own and others' design-researcher identities and agencies. Figure 1 presents our framework of design research as social action, which offers a theory for analyzing (i.e., summarizing and categorizing) salient aspects of a phenomenon that lacks prior research (Gregor 2006). In line with nexus analysis, the framework underscores the situated nature of design research involving multiple disciplines (Scollon & Scollon 2004). There are the habitual and interactional aspects, the notion of a historical body as capturing what is embedded in us (our histories, experiences, practices) without us noticing, and the notion of interaction order capturing relational configurations that emerge through our hard work to sustain a social order and smooth operation (Scollon & Scollon 2004). It is important to note that for the social action under scrutiny, the elements in the framework are intertwined but analytically separable (Scollon & Scollon 2004). The framework can be interpreted to encompass what design research with multiple disciplines entails as an interactional, situated human activity. However, it should not be interpreted as an idealized or prescriptive model, i.e., it outlines what *is* rather than what *should be*.

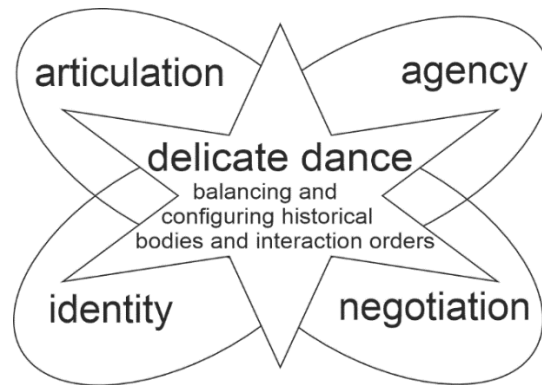


Figure 1. Framework of design research with multiple disciplines

In this framework, identity and agency are seen as processes that entail extensive articulation and negotiation. Identity is seen as situational, relational, and performative; being constantly explored, produced, performed and negotiated in interaction with others, concerning particular modes of subjectivity – giving us a sense of who we are and where we belong (Buckingham 2008, Schultze 2014, Scollon & Scollon 2004, Weedon 1987, 2004). In design research, articulating our own and others’ identities entails expressing or verbalizing particular modes of subjectivity related to design research. This is critical at the beginning of a collaboration between different disciplines without a shared historical body for articulating the expertise needed and present. In the case in question, each participant’s articulation of their stance and expertise was important for envisioning digital futures together. Identity negotiation in this context entailed connecting, comparing celebrating, questioning, or renewing modes of subjectivity in collaboration with others. The process of doing so was ongoing as the parties gradually learned about each other’s expertise and potential to contribute to the joint endeavor. The process also entailed building and celebrating new, potentially shared, design-researcher identities around collaboration with multiple disciplines.

Meanwhile, in the framework, agency is approached as a situational, relational and performative as well as inventive and reflective capacity to act in order to influence or transform the world (Emirbayer & Mische 1998, Kajamaa & Kumpulainen 2019, Rainio 2010, Rajala et al. 2013). Articulating one’s own or others’ agency in design research entails expressing or verbalizing who has the capacity to act, i.e., in this case, to specify the imagined digital future. Articulation is required early in the process, while negotiation of agency may be ongoing, i.e., agency may not be easily settled, or a need for its renegotiation may emerge. Negotiation in this context entails connecting, comparing celebrating, questioning, or renewing one’s own or others’ agencies in collaboration. Such collaborative negotiation is critical for establishing shared practices among professionals from multiple disciplines. In the case of envisioning digital futures together, collaborative agency negotiation and support for building everyone’s design agency was essential, particularly for those originally lacking agency.

We found in this research that at the intersection of identity and agency, where they were articulated and negotiated, participants in design research from different disciplines engaged in a delicate dance (Aiello & Nero 2019, Giampapa 2011). They not only performed their identities and accomplished their tasks but also delicately sought to balance their efforts with those of others. To that end, they engaged in balancing and configuring participants’ historical bodies and interaction orders among them, part taking also in renewing of them. Both historical bodies and interaction orders, identities and agencies were in flux. It seems that such a delicate dance is inherent to design research with professionals from multiple disciplines.

5.2. Implications for IS research and practice

Our study contributes to IS research by 1) scrutinizing research practice with the situated perspective, 2) advancing design research in IS by explicating what doing design research with multiple

disciplines, or even doing transdisciplinary design research, entails in practice and 3) offering actionable insights for IS design research methodological training and IS design.

Scrutinizing research practice with the situated perspective. This study underscores that research practice is to be approached as a social action, among other social actions, entailing a complex configuration and evolution of historical bodies and interaction orders among participants (see Scollon & Scollon 2004). This study has particularly highlighted identity- and agency-related articulation and negotiation, while emphasizing that other aspects may emerge as more relevant in other projects, with other participants, relying on other research approaches. Despite this, an overall message to the IS community is that we should devote more attention to our research practice as social action which is always habitual, embedded in our historical bodies but also strongly interactional, entailing complex and delicate configuration and balancing of our historical bodies and interaction orders. The methodological discussion in IS research has previously acknowledged the nature of research as human activity only to a limited extent. In line with that, we maintain that various values and forces shape our research, creating the need to adopt a reflexive stance. Our study offers a framework to continue this work, that is, to make sense of, conceptualize and develop our research practice. This framework is designed to chart how historical bodies and interaction orders are shaping our research practices through habitual and embedded yet delicate interactions *in situ*. The results of this study also indicate how we can better support design research practice, especially when involving multiple disciplines.

This study ***renews the design research discourse in IS***, in which the relevance of working with multiple disciplines and the need to engage in transdisciplinary design research, characterized by wicked problems, emergent methods and extensive collaboration (Hevner et al. 2022, Labadie & Legner 2022, Legner et al. 2022, Monson 2021) have been realized. Some studies have already reported on how to go about doing design research with multiple disciplines (Dolata & Aleya 2022, Kuhlmeier et al. 2022, Möller et al. 2022, Rajamany et al. 2022), but none have yet provided strong empirical evidence or in-depth insight into the complexities in this emerging context. This study offers conceptual clarification as well as a framework for exploring and developing the emerging transdisciplinary design research practice. As for the former, we propose a categorization from other disciplines that includes somewhat different criteria for transdisciplinary research than those previously used in design research in IS (Hevner et al. 2022). We, in line with Choi and Pak (2006), emphasize transforming disciplinary boundaries or the disciplines involved as essential for transdisciplinary research, in addition to collaboration with stakeholders, emergent methods development and addressing of wicked problems (see Hevner et al. 2022). We acknowledge that emergent methods development may transform the disciplines involved, but this has not been explicitly discussed in the literature. We also point out that the current discourse on transdisciplinary design research in IS may actually concern interdisciplinary or multidisciplinary design research, not the transdisciplinary form, while we hope we will move towards transdisciplinary one in the future.

As for the latter, the framework proposed in this study enables exploration and reflection on our current design research practice with multiple disciplines' involvement as well as serious further development of it towards more transdisciplinary manner (see also below). Design research in IS should start to acknowledge and examine further articulation and negotiation of identity and agency as habitual and deeply embedded in our bodies, as interactional in the sense of hard and delicate balancing and configuring of interaction orders and historical bodies among the participants and as situational in the sense of being always tied to particular place, time and participants. Now, we call for empirical studies on transdisciplinary design research, where researchers from multiple disciplines collaborate with practitioners to tackle wicked problems with emergent methodological and theoretical framings that move beyond the current disciplinary boundaries.

This study has ***implications for design research methodological*** training, which should better integrate the involvement of multiple disciplines. IS research methods education offers plenty of

textbooks and articles for informing students about different research approaches and their peculiarities. Closest to the situated perspective advocated in this study are developments in ethnographic studies, particularly those representing confessional (Schultze 2000) or autoethnographic (e.g., Bødker & Chamberlain 2016, Ghita 2019, Riordan 2014) genres, or critical research (Stahl et al. 2011). Generally, in qualitative, interpretive research, researchers' self-reflection has been encouraged (e.g., Cecez-Kecmanovic 2011, Cecez-Kecmanovic et al. 2020, Klein & Myers 1999). One could expect that researchers relying on design research, action research or engaged scholarship research also benefit from reflecting on their practice and positioning in their research.

Our work extends the prior design research methodology guidelines, which currently emphasize collaboration with practitioners (Sein et al. 2011, see also Mullarkey & Hevner 2019), but not collaboration among researchers. Our framework on articulating and negotiating identity and agency should help in making sense of and developing collaborations with practitioners, too. It has already been acknowledged in design research in IS that design researchers need to carefully reflect on their roles and influence in the process – on their identity and agency – and to settle those with practitioners. This is reflected in the action design principles of reciprocal shaping, mutually influential roles, authentic and concurrent evaluation, and guided emergence (Sein et al. 2011, see also Mullarkey & Hevner 2019). We offer insight on this process. Then again, the principles of reciprocal shaping, mutually influential roles, and guided emergence can also be reinterpreted to address researcher collaboration, in which case they can be seen as being well in line with our framework on researcher agency articulation and negotiation: the principles can be seen as an invitation to consider which roles each researcher can and should adopt in design research, acknowledging that each researcher shapes the other participants, the process and the outcomes, guiding their emergence.

We propose that our methodological guidance should be developed to encourage design-researchers to reflect on how their research work entails identity performances and articulations, through which they come across as particular kinds of design-researchers (inspired by Buckingham 2008, Scollon & Scollon 2004, Weedon 1987, 2004). We should also encourage critical reflection among future IS researchers on how they develop, draw on and enact their historical bodies (Scollon & Scollon 2004). To produce true value from collaboration among multiple disciplines, future IS researchers should be made aware of how much articulation, negotiation and balancing work is involved: delicate balancing of participants' historical bodies and interaction orders (cf. Goffman 1983, Scollon & Scollon 2004). We are forming alliances, expressing affinity and compassion, celebrating collaboration and team spirit, inviting others to participate, laying the grounds for others to contribute and weaving others' contributions carefully into the joint endeavor. We are working hard to maintain harmony, while misunderstandings and interactional trouble may prevail (cf. Donovan et al. 2011, Heinemann et al. 2012, Luck 2013). We should acknowledge that multiple agencies may compete for the power to define the design solution (cf. Giampapa 2011, Muhammad et al. 2015), in which case agency articulation and negotiation may require serious attention from the participants. Education on IS research methods should prepare future IS researchers to facilitate reflection, articulation, and negotiation among research participants, each with particular baggage. Overall, the situated perspective invokes discussion and reflection concerning the following questions: What kind of design-researchers we wish to be and come across as being? What kind of design-researcher identities and agencies we are articulating and performing? What kinds of delicate dances we engage in to make design research happen? We recommend not only reflection on these aspects but also consideration on how to better support “doing design research” and “being a design-researcher.”

Furthermore, our findings indicate that IS researchers, if aiming toward transdisciplinary design research (Choi & Pak 2006, Stock & Burton 2011), should be better prepared for the delicate dance. One could even claim that it is IS researchers' task and duty to arrange for smooth collaboration in projects involving multiple disciplines since the expertise of IS professionals is seen to facilitate other stakeholders' participation (Markus & Mao 2004). As we are experts on the digital component, and

other participants can struggle to envision or understand the implications of that component, we must work hard to make sure this does not present a barrier to their meaningful contributions. Additionally, as our discipline has been shaped and transformed by many different disciplines during its lifespan (Farhoomand & Drury 2001, Tarafdar & Davison 2018), and as many of our topics necessitate contributions from different disciplines (e.g. Elliot 2011, Sedera et al. 2017, Tarafdar & Davison 2018), we should be well-prepared as well as eager to take the lead in orchestrating collaboration. In sum, we should be ready for the delicate dance involved in transdisciplinary design research projects, whereby we aim to harness and integrate the contributions of different disciplines and, while doing so, transcend disciplinary boundaries. We should celebrate the delicate dance as a skillful *in-situ* accomplishment, as well as provide better support for all contributors.

Implications for IS design. This study underscores the need to create space for identity and agency to be articulated and negotiated in design research involving multiple disciplines. Currently, basic tools such as mailing lists may serve the purpose, but better tools could be provided. In the empirical case, identity and agency were articulated and negotiated digitally. Digital research work, in the aftermath of the COVID-19 pandemic, is common today (equally the case in other domains—see, e.g., Carillo et al. 2021, Hafermaltz & Riemer 2021, Waizenegger et al. 2020). Accordingly, our research work and collaboration with other researchers is almost entirely digitally mediated. Without digital tools, it would not exist. In remote or distributed research projects, digital technology is a compulsory mediator of our reality (cf. Baskerville et al. 2020). In the empirical case, the shared mailing list provided design-researchers an invaluable forum for articulating and negotiating identity and agency. However, we should consider what kinds of digital tools would serve the purpose better.

There are plenty of existing tools for augmenting research work: tools for literature reviews, design and development, data analysis and reporting. However, as interactional work is heavily involved in research, there is a need for better digital support. For instance, we should develop tools for reflecting on our own disciplinary baggage and positioning; such tools should help display, articulate, verbalize, and perform particular design-researcher identities. Similar identity technologies and features (e.g., Light 2011, Oulasvirta & Blom 2008, Zhang 2008) have been discussed in other contexts, which could offer us some inspiration along this path. In addition to supporting self-reflection, these tools should also make our disciplinary expertise visible to others, as well as inspire negotiation within the team. As for negotiation and articulation work, the literature on computer-supported cooperative work emphasizes mutual understanding and supporting collaborative work over long periods. This could provide insights into the design of advanced solutions that may facilitate the invisible interactional work required for smooth operations (e.g., Baker & Millerand 2007, Schmidt 2008, Suchman 1996). In the empirical study, very mundane tools seemed to be in use, while in the future IS research could offer more advanced solutions enabling this pivotal yet invisible work.

5.3. Conclusion

This study explored how design research with multiple disciplines is accomplished. Such an understanding is lacking in IS, even if the research community has shown increasing interest in transdisciplinary design research. This study applied a situated perspective on design research with multiple disciplines. It was approached as a complex, skillful interactional accomplishment *in situ* with extensive and continual articulation and negotiation of identity and agency. Doing design research and being a design-researcher were characterized as a delicate dance, which draws on participants' pasts and projects the future. The situated perspective enabled serious reconsideration and development of our education on research methods, with implications for digitally augmenting our research work. This study was limited to one case with many peculiarities and with detailed examination of particular aspects of interaction. In the future, more cases and more varied cases should be studied through this lens, including different disciplines, technologies under development as well as design and research epistemologies.

ACKNOWLEDGEMENTS

This work was supported by the Academy of Finland [324685].

REFERENCES

- Agarwal, R. 2016. "Editorial – On the Intellectual Structure and Evolution of IRS". *Information Systems Research* (27:3): 471-477.
- Aiello, J., Nero, S. J. (2019). Discursive dances: Narratives of insider/outsider researcher tensions. *Journal of Language, Identity & Education*, 18(4), 251-265.
- Alvesson, M. (2010). Self-doubters, strugglers, storytellers, surfers and others: Images of self-identities in organization studies, *Human Relations*, 63(2), 193–217.
- Andrade, A. D., & Doolin, B. (2016). Information and communication technology and the social inclusion of refugees. *Mis Quarterly*, 40(2), 405-416.
- Ashmore, R.D., Deaux, K. and McLaughlin-Volpe, T. (2004). An organizing framework for collective identity: Articulation and significance of multidimensionality, *Psychological Bulletin*, 130(1), 80
- Avital, M., Mathiassen, L., & Schultze, U. (2017). Alternative genres in information systems research. *European Journal of Information Systems* 26.
- Baker, K. S., & Millerand, F. (2007). Articulation work supporting information infrastructure design: Coordination, categorization, and assessment in practice. In 2007 40th Annual Hawaii International Conference on System Sciences (HICSS'07) (pp. 242a-242a). IEEE.
- Baskerville, R. L., & Myers, M. D. (2015). Design ethnography in information systems. *Information Systems Journal*, 25(1), 23-46.
- Baskerville RL, Myers MD, Youngjin Yo. (2020). Digital First: The Ontological Reversal and New Challenges for Information Systems Research. *MIS Quarterly* 44(2): 509-523.
- Bergman, M., Lyytinen, K., & Mark, G. (2007). "Boundary objects in design: An ecological view of design artifacts". *Journal of the Association for Information Systems* (8:11).
- Bernroider, E. W., Pilkington, A., & Córdoba, J. R. (2015). Research in information systems: a study of diversity and inter-disciplinary discourse in the AIS basket journals between 1995 and 2011. In *Formulating research methods for information systems* (pp. 11-47). Palgrave Macmillan, London.
- Bietti, L. M., Baker, M. J., & Détienne, F. (2016). Joint remembering in collaborative design: a multimodal approach in the case of a video design studio. *CoDesign*, 12(4), 221-242.
- Bilandzic, M., and Venable, J. 2011. "Towards participatory action design research: adapting action research and design science research methods for urban informatics". *The Journal of Community Informatics* (7:3).
- Birch, J., Parnell, R., Patsarika, M., & Šorn, M. (2017). Creativity, play and transgression: children transforming spatial design. *CoDesign*, 13(4), 245-260.
- Bødker, M., & Chamberlain, A. (2016). Affect theory and autoethnography in ordinary information systems. In *Proc. ECIS2016*.
- Bourdieu, P. (1977). *Outline of a theory of practice*. Cambridge: Cambridge University Press.
- Brooks, N. G., Riemenschneider, C. K., Hardgrave, B. C., & O'Leary-Kelly, A. M. (2011). IT professional identity: needs, perceptions, and belonging. *European Journal of Information Systems*, 20(1), 87-102.
- Buckingham, D. (2008). *Introducing identity*. MacArthur Foundation Digital Media and Learning Initiative.
- Carillo, K., Cachat-Rosset, G., Marsan, J., Saba, T., & Klarsfeld, A. (2021). Adjusting to epidemic-induced telework: Empirical insights from teleworkers in France. *European Journal of Information Systems*, 30(1), 69-88.
- Carter, M., & Grover, V. (2015). Me, my self, and I (T). *MIS quarterly*, 39(4), 931-958.
- Ceccez-Kecmanovic, D. (2011). Doing critical information systems research—arguments for a critical research methodology. *European Journal of Information Systems*, 20(4), 440-455.
- Ceccez-Kecmanovic, D., Davison, R. M., Fernandez, W., Finnegan, P., Pan, S. L., & Sarker, S. (2020). Advancing qualitative IS research methodologies: Expanding horizons and seeking new paths. *Journal of the Association for Information Systems*, 21(1), 1.

- Cecez-Kecmanovic, D., Kautz, K., & Abrahall, R. (2014). Reframing success and failure of information systems. *Mis Quarterly*, 38(2), 561-588.
- Choi, B. C., and Pak, A. W. (2006). "Multidisciplinarity, interdisciplinarity and transdisciplinarity in health research, services, education and policy: 1. Definitions, objectives, and evidence of effectiveness". *Clinical and investigative medicine* 29(6), 351.
- Chu, T. H., & Robey, D. (2008). Explaining changes in learning and work practice following the adoption of online learning: a human agency perspective. *European Journal of Information Systems*, 17, 79-98.
- Cross, N. (2001). Designerly ways of knowing: Design discipline versus design science. *Design issues*, 17(3), 49-55.
- Cummings, J., and Kiesler, S. (2003). "Coordination and success in multidisciplinary scientific collaborations". In *Proc. ICIS2003*.
- Davies, B., & Harré, R. (1990). Positioning: The discursive production of selves. *Journal for the Theory of Social Behaviour*, 20(1), 43-63.
- Davison, R. M., Martinsons, M. G., & Malaurent, J. (2021). Research Perspectives: Improving Action Research by Integrating Methods. *Journal of the Association for Information Systems*, 22(3), 1.
- De Vaujany, F. X., Walsh, I., & Mitev, N. (2011). An historically grounded critical analysis of research articles in IS. *European journal of information systems*, 20(4), 395-417.
- Dolata, M., & Aleya, K. B. (2022). Morphological Analysis for Design Science Research: The Case of Human-Drone Collaboration in Emergencies. In *International Conference on Design Science Research in Information Systems and Technology* (pp. 17-29). Springer, Cham.
- Donovan, J., Heinemann, T., Matthews, B., & Buur, J. (2011). Getting the point: The role of gesture in managing intersubjectivity in a design activity. *Artificial Intelligence for Engineering Design, Analysis and Manufacturing*, 25(3), 221-235.
- Dunne, A., & Raby, F. (2013). *Speculative everything: design, fiction, and social dreaming*. MIT press.
- Elliot, S. (2011). "Transdisciplinary Perspectives on Environmental Sustainability: A Resource Base and Framework for IT-Enabled Business Transformation". *MIS Quarterly* (35:1): 197-236.
- Emirbayer, M., & Mische, A. (1998). What is agency?. *American journal of sociology*, 103(4), 962-1023.
- Farhoomand, A., and Drury, D. H. (2001). "Diversity and scientific progress in the information systems discipline". *Communications of the Association for Information Systems* (5:1).
- Franklin, B. J. (2001). Discourses of design: Perspectives on the meaning of housing quality and 'good' housing design. *Housing, Theory & Society*, 18(1/2), 79-92.
- Ghita, C. (2019). In Defence of Subjectivity: Autoethnography and studying technology non-use. In *Proc. ECIS2019*.
- Giampapa, F. (2011). The politics of "being and becoming" a researcher: Identity, power, and negotiating the field. *Journal of Language, Identity & Education*, 10(3), 132-144.
- Goffman, E. (1981). *Forms of Talk*. Philadelphia: University of Pennsylvania Press.
- Gregor, S. (2006). The nature of theory in information systems. *MIS quarterly*, 611-642.
- Gregor, S., and Hevner, A. R. (2013). "Positioning and presenting design science research for maximum impact". *MIS Quarterly* (37:2): 337-355.
- Hafermalz, E., & Riemer, K. (2021). Productive and connected while working from home: what client-facing remote workers can learn from telenurses about 'belonging through technology'. *European Journal of Information Systems*, 30(1), 89-99.
- Haj-Bolouri, A., Bernhardsson, L., and Rossi, M. (2016). "PADRE: A Method for Participatory Action Design Research". In *Proc. DESRIST2016*.
- Hassan, N. R., Mathiassen, L., & Lowry, P. B. (2019). The process of information systems theorizing as a discursive practice. *Journal of Information Technology*, 34(3), 198-220.
- Heidegger, M. (1927/2011). *Being and Time* (J. Macquarrie & E. Robinson, Trans.). New York, NY: Harper & Row.
- Heinemann, T., Landgrebe, J. Matthews, B. (2012). Collaborating to restrict: a conversation analytic perspective on collaboration in design. *CoDesign*, 8(4), 200-214.
- Heritage, J. (1984). *Garfinkel and ethnomethodology*. Cambridge: Polity Press.

- Hevner, A., March, S., Park, J., and Ram, S. (2004). "Design science in information systems research". *MIS Quarterly* (28:1): 75-105.
- Hevner, A. R., Drechsler, A., Gerber, A. J. (2022): Preface. In Drechsler, A., Gerber, A. J., & Hevner, A. R. (Eds.). (2022). *The Transdisciplinary Reach of Design Science Research: 17th International Conference on Design Science Research in Information Systems and Technology, DESRIST 2022, St Petersburg, FL, USA, June 1–3, 2022, Proceedings* (Vol. 13229). Springer Nature.
- Holland, C. P. (2003). "The IS Core-X: Information Systems Research and Practice: IT Artifact or a Multidisciplinary Subject?". *Communications of the Association for Information Systems* (12:1).
- Horrigan-Kelly, M., Millar, M., & Dowling, M. (2016). Understanding the key tenets of Heidegger's philosophy for interpretive phenomenological research. *International Journal of Qualitative Methods*, 1-8.
- Hovorka, D. (2010). "Moving Beyond IS Identity: Concepts and Discourses". In Proc. ICIS2010.
- Iivari, N. (2018). Using member checking in interpretive research practice. *Information Technology & People* 31(1): 111-133.
- Kajamaa, A., & Kumpulainen, K. (2019). Agency in the making: Analyzing students' transformative agency in a school-based makerspace. *Mind, Culture, and Activity*, 26(3), 266-281.
- Klein, H. K., & Myers, M. D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS quarterly*, 67-93.
- Kuhlmeier, F. O., Gnewuch, U., Lüttke, S., Brakemeier, E. L., & Mädche, A. (2022, May). A Personalized Conversational Agent to Treat Depression in Youth and Young Adults—A Transdisciplinary Design Science Research Project. In *The Transdisciplinary Reach of Design Science Research: 17th International Conference on Design Science Research in Information Systems and Technology, DESRIST 2022, St Petersburg, FL, USA, June 1–3, 2022, Proceedings* (pp. 30-41). Cham: Springer International Publishing.
- Lang, M. (2003). "Hypermedia Systems Development: A Comparative Study of Software Engineers and Graphic Designers". *Communications of the Association for Information Systems* (12).
- Legner, C., Puro, S. & Rosemann, M. (2022): Introduction to the Theme Track: Transdisciplinary Research and DSR. . In Drechsler, A., Gerber, A. J., & Hevner, A. R. (Eds.). (2022). *The Transdisciplinary Reach of Design Science Research: 17th International Conference on Design Science Research in Information Systems and Technology, DESRIST 2022, St Petersburg, FL, USA, June 1–3, 2022, Proceedings* (Vol. 13229). Springer Nature.
- Lee, C. (2007). Boundary Negotiating Artifacts: Unbinding the Routine of Boundary Objects and Embracing Chaos in Collaborative Work. *Computer Supported Cooperative Work* 16(3): 307-339.
- Leonardi, P. M. (2011). When flexible routines meet flexible technologies: Affordance, constraint, and the imbrication of human and material agencies. *MIS quarterly*, 147-167.
- Levina, N. (2006). "Collaborating on Multiparty Information Systems Development Projects: A collective Reflection-in-Action View". *Information Systems Research* (16:2):109-130.
- Levina, N., and Vaast, E. 2005. "The Emergence of Boundary Spanning Competence in Practice: Implications for Implementation and Use of Information Systems". *MIS Quarterly* (29:2): 335-363.
- Light, A. (2011). HCI as heterodoxy: Technologies of identity and the queering of interaction with computers☆. *Interacting with computers*, 23(5), 430-438.
- Luck, R. (2013). Articulating (mis)understanding across design discipline interfaces at a design team meeting. *Artificial Intelligence for Engineering Design, Analysis and Manufacturing*, 27(2), 155-166.
- Lustig, C. (2019). Intersecting imaginaries: visions of decentralized autonomous systems. *Proceedings of the ACM on Human-Computer Interaction*, 3(CSCW), 1-27.
- March, S. T., & Smith, G. F. (1995). Design and natural science research on information technology. *Decision support systems*, 15(4), 251-266.
- Markus, M. L., and Mao, J. Y. (2004). "Participation in development and implementation—updating an old, tired concept for today's IS contexts". *Journal of the Association for Information systems* (5:11).
- Mathiassen, L. (2002). Collaborative practice research. *Information Technology & People*, 15(4), 321-345.
- Mathiassen, L., & Nielsen, P. A. (2008). Engaged scholarship in IS research. *Scandinavian Journal of Information Systems*, 20(2), 1.

- Matthews, B., & Heinemann, T. (2012). Analysing conversation: Studying design as social action. *Design Studies* 33, 649-672.
- McDonnell, J. (2009). Collaborative negotiation in design: A study of design conversations between architect and building users. *CoDesign*, 5(1), 35-50.
- Monson, M. (2021). Socially responsible design science in information systems for sustainable development: a critical research methodology. *European journal of information systems*, 1-31.
- Muhammad, M., Wallerstein, N., Sussman, A. L., Avila, M., Belone, L., & Duran, B. (2015). Reflections on researcher identity and power: The impact of positionality on community based participatory research (CBPR) processes and outcomes. *Critical Sociology*, 41(7-8), 1045-1063.
- Mullarkey, M. T., & Hevner, A. R. (2019). An elaborated action design research process model. *European Journal of Information Systems*, 28(1), 6-20.
- Myers, M. D., & Klein, H. K. (2011). A set of principles for conducting critical research in information systems. *MIS quarterly*: 17-36.
- Möller, F., Chandra Kruse, L., Schoormann, T., & Otto, B. (2022, May). Design Principles for Boundary Spanning in Transdisciplinary Design Science Research. In *The Transdisciplinary Reach of Design Science Research: 17th International Conference on Design Science Research in Information Systems and Technology, DESRIST 2022*, St Petersburg, FL, USA, June 1–3, 2022, Proceedings (pp. 42-54). Cham: Springer International Publishing.
- Newell, S., and Galliers, R. D. (2000). "More than a footnote: The perils of multidisciplinary research collaboration". In *Proc. AMCIS2000*.
- Nishida, K. (1958). *Intelligibility and the philosophy of nothingness: Three philosophical essays*, Robert Shinzinger (trans.), Honolulu: East-West Center Press.
- Norris, S. (2011). *Identity in (inter)action: Introducing multimodal (inter)action analysis*. Berlin: deGruyter Mouton.
- Norton, B., & Early, M. (2011). Researcher identity, narrative inquiry, and language teaching research. *Tesol Quarterly*, 45(3), 415-439.
- Oak, A. (2009). Performing architecture: Talking 'architect' and 'client' into being. *CoDesign*, 5(1), 51-63.
- Oulasvirta, A., & Blom, J. (2008). Motivations in personalisation behaviour. *Interacting with computers*, 20(1), 1-16.
- Peffer, K., Tuunanen, T., and Niehaves, B. (2018). "Design science research genres: introduction to the special issue on exemplars and criteria for applicable design science research". *European Journal of Information Systems* (27:2).
- Peffer, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of management information systems*, 24(3), 45-77.
- Purao, S., Baldwin, C. Y., Hevner, A., Storey, V. C., Pries-Heje, J., Smith, B., & Zhu, Y. (2008). The sciences of design: observations on an emerging field. *Harvard Business School Finance Working Paper*, (09-056).
- Rainio, A. P. (2010). *Lionhearts of the playworld: An ethnographic case study of the development of agency in play pedagogy*. University of Helsinki, Institute of Behavioural Sciences, Studies in Educational Sciences 233.
- Rajala, A., Hilppö, J., Lipponen, L., & Kumpulainen, K. (2013). Expanding the chronotopes of schooling for the promotion of students' agency. *Identity, community, and learning lives in the digital age*, 107-125.
- Rajamany, Vanitha, Judy A. van Biljon, and Cornè Johandia van Staden. "User Experience Requirements of Digital Moderation Systems in South Africa: Using Participatory Design Within Design Science Research." *The Transdisciplinary Reach of Design Science Research: 17th International Conference on Design Science Research in Information Systems and Technology, DESRIST 2022*, St Petersburg, FL, USA, June 1–3, 2022, Proceedings. Cham: Springer International Publishing, 2022.
- Raman, R., & McClelland, L. (2019). Bringing compassion into information systems research: A research agenda and call to action. *Journal of Information Technology*, 34(1), 2-21.
- Riemenschneider, C. K., & Armstrong, D. J. (2021). The Development of the Perceived Distinctiveness Antecedent of Information Systems Professional Identity. *MIS Quarterly*, 45(3), 1149-1186.
- Riordan, N. (2014). Autoethnography: proposing a new research method for information systems research. In *Proc. ECIS2014*.
- Rosenkranz, C., Vranesic, H., and Holten, R. (2014). "Boundary interactions and motors of change in requirements elicitation: a dynamic perspective on knowledge sharing". *Journal of the Association for Information Systems* (15:6).

- Sack, W., Détienne, F., Ducheneaut, N., Burkhardt, J., Mahendran, D. and Barcellini, F. (2006). A methodological framework for socio-cognitive analyses of collaborative design of open source software. *Computer Supported Cooperative Work* 15(2), 229–250.
- Sanders, L., & Stappers, P. J. (2014). From designing to co-designing to collective dreaming: Three slices in time. *interactions*, 21(6), 24-33.
- Schatzki, T. (2012). A primer on practices: Theory and research. In J. Higgs, R. Barnett, S. Billett, M. Hutchings, & F. Trede (Eds.), *Practice-based education: Perspectives and strategies* (pp. 13-26). Sense Publishers.
- Schmidt, K. (2008). Taking csw seriously: Supporting articulation work (1992). In *Cooperative Work and Coordinative Practices* (pp. 45-71). Springer, London.
- Schultze, U. (2000). A confessional account of an ethnography about knowledge work. *MIS Quarterly*, 3-41.
- Schultze, U. (2014). Performing embodied identity in virtual worlds. *European Journal of Information Systems*, 23(1), 84-95.
- Schultze, U., & Brooks, J. A. M. (2019). An interactional view of social presence: Making the virtual other “real”. *Information Systems Journal*, 29(3), 707-737.
- Scollon, R. (2001). Action and text: towards an integrated understanding of the place of text in social (inter) action, mediated discourse analysis and the problem of social action. *Methods of critical discourse analysis*, 113, 139-183.
- Scollon, R. & Scollon, S. W. (2004). *Nexus analysis: Discourse and the emerging internet*. Routledge.
- Scollon, S. W., & de Saint-Georges, I. (2013). Mediated discourse analysis. In *The Routledge handbook of discourse analysis* (pp. 66-78). Routledge.
- Sedera, D., Lokuge, S., Tushi, B., & Tan, F. (2017). Multi-disciplinary green IT archival analysis: A pathway for future studies. *Communications of the Association for Information Systems*, 41(1), 28.
- Sein, M. K., Henfridsson, O., Purao, S., Rossi, M., and Lindgren, R. (2011). “Action Design Research”. *MIS Quarterly* (35:1): 37-56.
- Stahl, B., Tremblay, M. & LeRouge, C. (2011). Focus groups and critical social IS research: how the choice of method can promote emancipation of respondents and researchers. *European Journal of Information Systems*, 20(4), 378-394.
- Stock, P., & Burton, R. J. (2011). Defining terms for integrated (multi-inter-trans-disciplinary) sustainability research. *Sustainability*, 3(8), 1090-1113.
- Stryker, S. (2008). From Mead to a structural symbolic interactionism and beyond. *Annual Review of Sociology*, 34, 15-31.
- Stuhlfauth, S., Foss, C., Knutsen, I. R. (2019). Coming from two different worlds — A qualitative, exploratory study of the collaboration between patient representatives and researchers. *Health Expectations*, 22(3), 496-503.
- Suchman, L. A. (1996). Supporting articulation work. In Kling, R. (Ed.) *Computerization and controversy: Value conflicts and social choices*. Elsevier.
- Tarafdar M., and Davison, R. (2018). “Research in Information Systems: Intra-Disciplinary and Inter-Disciplinary Approaches”. *Journal of the Association for Information Systems* (19:6).
- Thomson, P., & Gunter, H. (2011). Inside, outside, upside down: The fluidity of academic researcher ‘identity’ in working with/in school. *International Journal of Research & Method in Education*, 34(1), 17-30.
- Van Leeuwen, T. (2004). Ten Reasons Why Linguists Should Pay Attention to Visual Communication. In P. LeVine & R. Scollon (Eds), *Discourse and Technology: Multimodal Discourse Analysis* (pp. 7-19). Washington, DC: Georgetown University Press.
- Waizenegger, L., McKenna, B., Cai, W., & Bendz, T. (2020). An affordance perspective of team collaboration and enforced working from home during COVID-19. *European Journal of Information Systems*, 29(4), 429-442.
- Walsham, G. (1995). “Interpretive case studies in IS research: nature and method”. *European Journal of information systems* (4:2): 74-81.
- Walsham, G. (2012). Are we making a better world with ICTs? Reflections on a future agenda for the IS field. *Journal of Information Technology*, 27(2), 87-93.
- Weedman, J. (2008). Client as designer in collaborative design science research projects: what does social science design theory tell us?. *European Journal of Information Systems*, 17(5), 476-488.

Weedon, C. (1987). *Feminist Practice and Poststructuralist Theory*. Oxford, Basil Blackwell Ltd.

Weedon, C. (2004). *Identity and Culture: Narratives of Difference and Belonging*. New York, Open University Press.

Zhang, P. (2008). Motivational affordances: Reasons for ICT design and use. *Communications of the ACM*, 51(11), 145-147.