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Doctoral Colloquium

EXPLORING LEARNING IN HYBRID WORK: A WAY FORWARD

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Abstract. Hybrid work teams have recently gained popularity, with advances in digital technology and the pandemic problem, and are now essential for the new working world that has emerged since the outbreak. Consequently, workplace learning, which is crucial for employee development, has been affected, as the nature of work and the work environment is changing. There is therefore an urgent need for research on learning in the current hybrid work teams, as studies show that there is insufficient research on digital workplace learning, and businesses must adapt to this work model to survive. This study focuses on increasing the understanding of the learning process in hybrid work. The study employs a qualitative research strategy with multiple case studies on hybrid work teams. The data will be collected through in-depth interviews, focus groups, and observations with selected digitalized industrial firms. The study will contribute to the CSCW discourse by providing insights into the future of work teams, learning, and knowledge-sharing in such teams.

BACKGROUND AND RESEARCH QUESTIONS

There is no denying that COVID-19 has significantly impacted many of the ongoing changes in how we live and work, but regardless of the challenges, many firms are recognizing the opportunity to rethink the workplace for a post-pandemic future and are supporting more flexibility regarding working from

home and establishing virtual teams (Johnson, 2020). Although not new, the hybrid model of working, which combines working from an office and home or wherever the job requires and where individuals perform best, has created a chance to deviate from the standards surrounding conventional working styles (Ateeq, 2022). Likewise, Grzegorczyk et al. (2021), describe the hybrid work model as one in which employees can work at the office or from home, or mix it up throughout the work week, with certain workdays demanding all employees be physically present, and other days requiring a combination of physical and virtual attendance. Hybrid work models have been in the spotlight more since the global pandemic but they were already in use by many firms and are expected to become increasingly popular in the coming years regardless of the crisis (Çiftçi, 2021).

According to Sims et al. (2021), before the pandemic, research on remote and hybrid work began in the 1990s, when it was obvious that the internet and telecommunications technology could revolutionize several facets of society, including the workplace. In addition, they assert that contemporary studies are based on this earlier research, which focused on "the design and testing of non-commercial experimental communication platforms and peaked in the early 2000s"(p. 6). But despite more than two decades of study into remote cooperation by scholars in the interdisciplinary field of Computer Supported Cooperative Work (CSCW), the scope and context of remote work during the pandemic were exceptional with unique work conditions and challenges (Bjørn et al., 2019; Caldeira et al. 2022). The CSCW is primarily concerned with designing and evaluating technologies that enable groups of people to work together, hence it operates at the interface of computer science and the social sciences (Sims et al. 2021). Wilson (2018), also describes CSCW as a dynamic synthesis of human and technical aspects that can support both in-person and remote cooperation.

The CSCW field is well acquainted with the challenges of remote work, although the use of technologies to promote cooperation has changed significantly since the turn of the century (Flügge & Møller, 2022). Sims et al. (2021), however, note that though future office designs and hybrid meeting procedures are being discussed, the practicalities of hybrid work models are still being worked out, and there are not many studies presenting rigorous, thorough projections or depictions of future work models. Furthermore, Babapour et al. (2022) highlight that there have been insufficient studies on the ramifications of hybrid work, and that research is needed to examine the effects of remote, flexible, and hybrid work arrangements on office employees due to the obvious distinctions in remote work practices before, during, and after the pandemic. Thus, it may be argued that while there is a substantial body of literature on virtual/remote work, there is limited research on the new working life in the post-pandemic era, especially in the area of employee learning.

The nature of work and business will likely remain unpredictable and unclear for the foreseeable future, which is obvious given the current state of the business world (Tredinnick & Laybats, 2021). Moreover, the speed of change, the uncertainty of events, and the rapid advancement of modern technology affect the

workplace, impacting trends and approaches taken to employee development (Mikołajczyk, 2021). Hence, Davison & Ou (2017), note that workers must be digitally literate to participate in digital work. And according to Garsten & Jacobsson (2004), working and learning have always been interconnected as working requires learning, and workplace problem-solving, knowledge sharing, and group experimentation all contribute to learning. They further note that participation in learning activities occurs through and in social contact at work. Thus, workplace learning has become essential in the modern workplace, and to comprehend the changes in work, work design, and employee training, it can be inferred that one must consider learning in digital work, especially in hybrid work settings.

To understand learning, this study adopts a workplace learning viewpoint, which describes learning as "permanent or semi-permanent changes in how people think and act" prompted by formal training programs or primarily self-directed informal learning (Billett & Choy, 2013; Ellström, 2001; Billett, 2004; Lundqvist et al. 2022, p.2). Learning occurs throughout working life and is how employees engage with the social experiences at work, which can be viewed as an interdependent process between social and personal elements that are negotiated through involvement in work activities (Billett, 2008). Also, Schmidt (2016a), asserts that cooperative work is undertaken by competent employees and that to understand how such work is accomplished, we must first identify the work practices and describe how practitioners are educated and trained for the job they perform. This even becomes more important with the current hybrid work settings, where cooperative work is made possible with digital technologies. Thus, Paavola et al. (2012), emphasize that theories about human learning and cognition are increasingly highlighting collaboration, creative processes, and the use of new technology. However, Ackerman et al. (2013), note that the emphasis should be on socio-technical issues, even though information technology artifacts that externalize knowledge play a crucial role in the CSCW discourse.

Over the years, CSCW scholars have been developing a broad body of workplace studies in a variety of situations to understand cooperative work (Schmidt, 2016b). This study will add to the literature because workplace learning is important for both the organization and the workforce. According to Hiremath et al. (2021), learning and work are now more intertwined, and learning and development (L & D) interventions are mainly for improving competencies, skills, and professional growth among employees, however, learning engagement systems are significantly changing, and there are insufficient industry studies assessing the effects of technology on L&D with digital learning. Consequently, Gellerstedt et al. (2015), urge more research to maximize workplace learning and the best approaches to integrate work and learning. Tredinnick & Laybats (2021), also, list practical difficulties with teambuilding, scheduling, workflow, planning, and delivery of work that may not be easy to handle as some of the problems with hybrid and blended workplaces. But, even more of a concern is how employees learn in these circumstances. Mikołajczyk (2021), states that it is difficult to predict the long-term effects of the COVID-19 pandemic on leaders, teams, and

organizations, but developing hybrid learning will become more crucial than ever. Thus, Rigolizzo (2022) calls for new approaches to workplace learning with this work pattern, noting that though the context for learning has changed, how people learn has not, hence the need for strategies as to what applies in the hybrid space.

Against this background, this study, thus, aims to increase the understanding of the learning process in hybrid work, using a social-technical lens and workplace learning theories. It is also timely and relevant as businesses must adapt to this work model to survive. The objectives are to investigate how learning occurs in hybrid work, how it can be enhanced, and how this can contribute to CSCW. The research questions formulated for the study are: How do various learning modes influence learning outcomes in hybrid work and how does the use of technology affect the quality and effectiveness of learning in hybrid work?

METHODOLOGICAL APPROACH

To accomplish the study's aims and objectives and provide the necessary information to address the research questions, this study uses a qualitative research methodology with multiple case studies in a selection of digitalized industrial firms with hybrid work teams. The study also employs an interpretivist epistemology, a stance that advocates for social scientists to comprehend the subjective meaning of social action, and a perspective on social life that highlights how individuals interpret the world (Bryman, 2012; Bryman et al. 2022). Interpretivism offers an understanding of the phenomenon through the viewpoints of the hybrid workforce when contemplating how one may comprehend learning in hybrid work teams and the use of technologies for learning in such teams since their reality is socially constructed.

WORK/FINDINGS TO DATE

The overall focus of my doctoral research is to increase the understanding of the leadership and learning process in digitalized organizations especially hybrid work teams, as well as to investigate the opportunities and challenges therein. I conducted a pilot study in this regard, to serve as a foundation for more studies. The study used a qualitative research strategy and ran from November to December 2022. The data was collected through six in-depth interviews, with three leaders and three co-workers in a hybrid work team, within a knowledge-based international organization in Sweden. The participants were chosen based on their roles and experience of working in a hybrid mode. The questions focused on how both the leaders and co-workers have adjusted to working, leading, and

learning in a hybrid work team and what challenges and benefits they have encountered. The interviews were conducted in the English language, lasted 60-70 minutes, and were recorded and transcribed.

Hermeneutics was the analytic lens for analyzing the data. In the first step of coding, the transcripts were re-read to produce categories, pertaining to changing work modes, challenges, benefits, learning, and interactions between leaders and co-workers in the hybrid workplace, and some recurrent themes were identified. The concepts were more specifically examined in the second section of the investigation, which focused on how the leadership and learning process is carried out in the hybrid workplace and the new leadership challenges faced. The results of my pilot study have presented the opportunity to find a more complex leadership process within the hybrid workplace, as well as the learning processes occurring in hybrid work teams.

NEXT STEPS

I am further investigating learning in hybrid work teams, and I have chosen some large knowledge-based organizations in Sweden for my study. The data collection starts soon and will be collected through in-depth interviews, observations, and focus groups. I intend to conduct a longitudinal study to observe learning in hybrid work teams over a period of time. This methodical approach is appropriate for this study because of its exploratory nature and its focus on deepening our understanding of the learning process in hybrid work. This will enable me to capture the dynamic aspects of work and learning in such teams, as it is vital to see how digitalized cooperative work is connected to learning, from a CSCW perspective.

EXPECTED CONTRIBUTIONS

The results of the study will reveal the learning process, the learners' perceptions, the interactions, participation, and the use of digital tools for learning in hybrid work teams. The study will provide insights into the future of work teams, learning, and knowledge-sharing in such teams. It will help to improve practice for managers and employees in hybrid work teams. This research will also contribute to CSCW research by way of investigating workplace learning in hybrid work teams. Additionally, it will help identify gaps in current research,

and advance ongoing research because this area of study needs more investigation.

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Yes, we care? A sociomaterial perspective on care work and technology

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Abstract. With aging societies and care crises on the one hand and new robotic technology and artificial intelligence on the other, there are certain hopes that the technology of the future can provide solutions to social problems. My dissertation aims to paint a realistic picture of the situation and to point out not only potential but desirable developments. My focus is on care for people of older age, and I am particularly interested in the entanglement of work, organization, and technology following a sociomaterial approach. Specifically, I want to explore how and under what conditions new (robotic) technology can be aligned with the values and professional identities of those working in care. Furthermore, I would like to investigate these aspects on the level of processes and structures of the organization. Methodologically, I am following a qualitative social research approach, with data being collected in the context of the project 'Caring Robots // Robotic Care'. Finally, with my dissertation, I aim at contributing to the knowledge of how technology development in the field of care can take into account ethical aspects and the interests of the various affected groups.

Introduction and Theoretical Approach

With the end of the so-called Fordist sexual contract (Adkins and Dever 2016) and an aging society many industrial countries face an increasing demand for care services. There are certain hopes that AI and robotics can provide solutions or at least alleviate this type of care crisis. In Scandinavia the research on so-called welfare technologies has shown how new care technologies are applied to tackle issues of an aging society – also to increase autonomy and quality of life for clients while "creating work that is smarter and more qualified" (Kamp et al. 2019:1). Besides these goals, political strategies also intend to produce "labor-saving technologies" (Kamp et al. 2019:2). This emphasizes the relevance to examine how these new technologies are implemented into workplaces and how they are perceived by the workers affected.

In my dissertation, I want to investigate the application of robotic technologies in the context of elderly care with a focus on work and organization. In this field, some attempts were made to design robots for care facilities and home settings to make the elderly lives saver (fall prevention), to entertain, and to provide support for physical or cognitive exercise. Robotic solutions already applied in this context are Baxter (Fitter et al. 2020), Pepper (Martinez-Martin and Cazorla 2019), Double Robot (Lotfi, Langensiepen, and Yahaya 2018), Vizzy (Avelino et al. 2018), PALRO (Obo et al. 2017), NAO and Paro (Lewis, Metzler, and Cook 2016). The development of so-called care technologies often has been driven by technological feasibility, although trying to increase practicality by means of user-centered approaches. Nevertheless, the adoption rate of these robotic technologies remains rather low (Ienca et al. 2016). Furthermore, not only feasibility and adoption rates but also ethical aspects challenge these developments. Therefore, it is crucial to take into account different stakeholders' perspectives to understand what robotic systems should do in a care context instead of what they could do (Vallès-Peris and Domènech 2021). Within our research project 'Caring Robots // Robotic Care'[1], we follow a Participatory Design (PD) approach (Frauenberger, Spiel, and Makhaeva 2019) not only to take into account different stakeholders' perspectives but also to enable them to shape the design process themselves. To consider a perspective of care ethics and values in our approach, we include the care-centered value-sensitive design framework (CCVSD) by van Wynesberghe (2013) to guide our research activities. Moreover, I build on the "Caring in the in-between" approach by Vallès-Peris & Domènech (2020, 2021) which stresses the importance of a discussion on the context of use when assessing ethics regarding care technologies.

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[1]   https://www.caringrobots.eu/

Theoretically, I will follow Wanda Orlikowski's (2007) approach called *sociomateriality* in order to gain a profound understanding of technology. She emphasizes that "organizational practice is always bound with materiality", as analyzing technology in the context of work (Orlikowski 2007:1436). Therefore, she argues it is crucial to overcome limited perspectives that either focus on technology effects or human interaction with technology (Orlikowski 2007). She proposes the concept of "constitutive entanglement" of the human and technology (instead of "mutual" or "reciprocal" interaction) to emphasize the relationship between social and material: "there is no social that is not also material, and no material that is not also social" (Orlikowski 2007:1437). The often-used concepts of "mutual" or "reciprocal" interaction between the social and the material imply an "a priori independence of these entities from each other" which Orlikowski (2007:1438) negates. Instead, she argues that "humans are constituted through relations of materiality", thereby referring to humans having bodies, wearing clothes, and using tools which all are produced through social practices (Orlikowski 2007:1438). Thus, we should not refer to social practices in organizations but sociomaterial practices, as the material is intrinsic to organizations and the social itself. This approach of sociomateriality facilitates a profound analysis of the entanglement of technology and the social, including questions about the power within work relations, occupational boundaries, and professional identities.

Regarding the understanding of care work, Müller (2020) differentiates three dimensions that are essential to care. The first dimension of care inhibits aspects of human vulnerability, dependence on others, and social relations. Essential to the second dimension is the care process of establishing a relationship between the caregiver and care receiver which is interdependent. The third dimension emphasizes physical or bodily aspects of care, building on a phenomenological approach. Müller (2020:66) also addresses the context of care work: patriarchal capitalism. Many scholars have pointed out the gendered and racialized division of labor in society, especially concerning care work (Aulenbacher 2010). Paid and unpaid care work is mostly done by women (Appelt and Wolf 2010). As especially migrant women work perform elderly care, an intersectional perspective is crucial to understand how different forms of inequalities as gender, ethnicity, and class, produce "intersecting sources of subordination/oppression" (Denis 2008:677 as cited in Durbin and Conley 2010:193).

Research Questions and Expected Contribution

As shown above, the crucial role of gender has to be emphasized in the field of care work because it is traditionally a women's domain. In contrast, the design of technology on the other hand is mostly performed by men. This raises questions

concerning the entanglement of technology and gender and/or professional identity. Haas' et al. (2016:399) refer to professional identity as "formed through accumulated individual experience within a profession over time [that] is strongly influenced by norms, attributes, and motives for the profession". They showed in their study on women pursuing academic careers in Science, Engineering, and Technology that it is difficult for individuals to overcome traditional gender norms linked to technology. Their explanation draws on the fact that traditional gender norms are also inherent to organizational structures. These findings can be associated with the debate on the feminization or masculinization of certain occupational fields as mentioned before in the context of the history of health professions (Lindsay 2007).

Regarding new technologies and care workers' identities, Kamp et al. (2019:1) provide an overview of the debate on the "transformation of what care and care work are about" in the context of new technologies. They emphasize the relevance of the challenges for the workers' concept of their profession and identity, besides the important question of a new division of labor between humans and machines (Kamp et al. 2019:6). Ajslev et al. (2019) analyze how the professional identity of care workers can facilitate but also impede the introduction of new technology. Previous research showed that identity can augment resistance against new technologies when there are contradictions between technology and the concept of care itself (Clark and Thompson 2015). Several scholars have shown that professional identity in care is connected to care values (Fagermoen 1997; Hoeve, Jansen, and Roodbol 2014).

Therefore, I aim to reconstruct the workers' professional (gendered) identity by means of their values. I want to contribute to the knowledge of how technology can be aligned with their professional identities. Therefore, I reveal the underlying assumption of my research question based on the findings of the scholars mentioned above: if technology is opposed to the workers' identities it will not be accepted or can lead to resistance. Therefore, I ask:

What are the care workers' professional identities and how are they positioned toward care technology? What does this mean for developing new robotic technologies in an ethical way?

Methods & Data

In the following, I will elaborate on my *Methodological Approach* and the *Work/Findings to Date* by explaining the context of the (first round of) data collection. In the section *Next Steps*, I will clarify what data collection is in the planning to answer my research question.

Methodological Approach

Within the project Caring Robots/Robotic Care, we follow a Participatory Design (PD) methodology. PD has its roots in Scandinavia, where it was established to enhance empowerment, "re-skilling" (Bjerknes, Ehn, and Kyng 1987) of workers, and democratization of the labor market. This approach aims at including different stakeholders' perspectives from the beginning of the research process. In this context, we have already completed the first phase of data collection with participant observations, interviews, and workshops with care workers and care recipients. For my analysis, I combine the Participatory Design framework with a Grounded Theory approach. More closely, I follow what Charmaz (2008:160) calls a constructivist approach, which makes the influences of the researcher's perspective explicit: "Researchers view themselves embedded in the research process rather than as distanced observers". Although PD and Grounded Theory have different methodological foundations within qualitative research, Teram et al. (2005) have shown how these schools can be applied together fruitfully. Especially, to overcome power inequalities between different groups of participants (e.g. care workers and recipients; or care workers and their superiors), it has proven useful to combine these approaches.

Work/Findings to Date

So far, work to date for my dissertation project was done within the FWF-funded project 'Caring Robots // Robotic Care', which was made possible through the transdisciplinary funding scheme #connectingminds. In cooperation with the project practice partners, i.a. Caritas der Erzdiözese Wien, we collected data in a first phase to get a more profound understanding of the care context itself. More precisely, we applied methods as participatory observations in a nursing home as well as in the context of mobile care of Caritas as a first step. Thereby, we accompanied care workers of the different occupational groups (certified health care and nursing staff, nursing assistants, etc.) during their daily shifts for several days. Furthermore, we conducted problem-centered interviews with care workers and workshops using a card-based tool (Schwaninger 2021). In these workshops, caregivers as well as people in need of care were involved in order to get a comprehensive picture of the negotiation processes that take place within care relationships. One focus of this data collection was firstly the question of what constitutes good care, where we looked more closely at values and ethical aspects of care. The second focus was the question of the potential of new technologies starting from different specific nursing practices.

For my dissertation, I started to analyze the data following Grounded Theory by Charmaz (1996), which emphasizes the iterative nature of this process. More

specifically, I began with *line-by-line coding* which "helps to see the familiar in a new light" (Charmaz 1996: 38).

Next steps

The next steps would be to move to *focused coding* (Charmaz 1996) to compare codes and categories that emerged from the line-by-line coding. Instead of seeing the outcome of the focused coding as the final results, I plan to use these initial analyses as a basis for further data collection that will allow me to answer my research questions more closely. So far, we could not yet define a specific care situation or practice, we would like to support with technology. Nevertheless, our data suggested that the moment of admission into a care home is crucial, sensitive, and often difficult for both, care workers and care recipients. We take this as a starting point, to conduct further workshops where we use participatory design methods (e.g. Ostrowski et al. 2021) to encourage care workers and recipients to envision a technology for care related to this starting point. Therefore, we plan to introduce different technological compartments[2] to enable participants to gain a more concrete understanding of robotic technologies and then to have them discuss their ideas.

My goal is to explore how care workers position themselves to these technologies and how they negotiate them regarding their work. Therefore, we ask questions about potential chances and risks of using, combining or adjusting compartments for their work, and about the relevance of those for their understanding of *good care*. By means of the coding process by Charmaz (1996) as described above, I intend to analyze the transcriptions of these workshop settings. Thereby, I aim at detecting patterns in the data to trace the workers' underlying values and self-conceptions as professionals. By reconstructing identity aspects in relation to technology, I expect to contribute to the understanding of care workers' perspectives and needs when developing new care technology.

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[2] Within the participatory design process, we have not decided until the due date of this proposal for ECSCW2023, what compartments will be included into the selection for the workshops. To give an example, these compartments could include cameras, microphones, navigating systems and other robotic sensors.

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Biography

I am a Ph.D. candidate and university assistant at TU Wien at the Institute of Management Science, Department of Labor Science and Organization. I obtained my interdisciplinary academic education in sociology, business, and economics within different European countries, I have studied at the University of Basel, the University of Granada, and the University of Vienna.

My main research interests revolve around the entanglement of work, organization, and technology. In my dissertation, I want to explore the (potential and desirable) roles of robotic technology in care work applying a gender-sensitive, sociomaterial perspective. In the context of the project 'Caring Robots // Robotic Care' I contribute to the conceptualization and implementation of the participatory design process, as I have experience with empirical social research. Finally, I aim at getting a deeper understanding of the potential chances and risks of robotics for care work.

Statement: Hopes and expectations

For my participation in the *doctoral colloquium* of *ECSCW2023*, I expect to engage in stimulating discussions and receive feedback on my current research. Specifically, I would like to discuss my preliminary findings on my research question on how care technologies can be aligned with the care workers' professional identities and what this means for developing new robotic technologies in an ethical way. Furthermore, I hope to get inspired regarding future research, especially regarding methodological questions regarding participatory design and how social and ethical aspects can be translated into technology. Additionally, I hope to specify my theoretical contribution thanks to the academic exchange within the conference. Besides the feedback on my own work, I look forward to hearing about other research projects and expect to broaden my perspective on topics regarding new technologies and labor. Ideally, I hope to meet scholars who are interested in academic exchange beyond the conference and that there might even be a chance for future research collaborations.

The new public encounter: Where citizens meet the state-bot

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Abstract. This document gives an overview of the topic, research questions and current status of the authors PhD project. This research aims to investigate the impacts of digitalization of the interaction between state and public, also known as public encounter, on the citizens perception of their government. More specifically the author wants to find out whether the use of Information and Communication Technologies (ICTs) influences how the citizen perceives their government and if so whether it is possible to design these ICTs in a way that will foster a positive perception. The citizens perception of their government will be evaluated by assessing a given set of public service values. The goal is to develop a framework which can guide the design and implementation of digital public encounters in a way that contributes to a positive citizens perception of their government. The research focuses on the Norwegian context by investigating the nature of public encounters between government institutions and citizens.

Introduction

Today, our everyday lives rely heavily on the use of digital tools. They are already embedded in nearly all societal functions, from healthcare to education and banking to traveling. Although the digital tools applied vary from field to field, what many of them have in common is the replacement of physical human-to-human interactions (Hassani et al., 2021; Sætra & Fosch-Villaronga, 2021). The physical human-to-human interaction is often replaced by self-services, automatization, or a digital interaction. This trend is also visible in the public sector through the digital transformation of governments and their institutions – turning into electronic (e-) governments. E-governments are meant to increase well-being, democratic values, transparency, participation, and accountability. Furthermore, the use of Information and Communication Technologies (ICTs) in governments have opened an opportunity to change the relationship between government and citizens in a way that contributes to the goals of better government which is more responsive to the needs of citizens, more democratic, more efficient, and more transparent (Bekkers & Homburg, 2007; Castro & Lopes, 2022).

One very important aspect of governments and its institutions is the interaction or contact between public officials or the state and citizens, also known as public encounter. The public encounter includes citizen-state interaction within the context of public service provision, but also other interactions such as voting, lobbying, and asking citizens for advice (Lindgren et al., 2019). Traditionally, the term public encounter described the face-to-face contact in a physical environment (Bartels, 2013). The introduction of ICTs in public administrations and other government services is shifting the public encounter away from face-to-face contact into digital environments, such as websites and mobile applications. ICTs which can be found in public service provision and state-citizen interactions are webpages, digital platforms, chatbots, computer games, virtual reality and augmented reality. While public service provision is mostly making use of webpages, digital platforms, and chatbots, other areas such as citizen participation in urban planning processes are using 3D-models (static, animated or virtual reality models), communication platforms, and computer games to facilitate citizen interaction (Hanzl, 2007). Virtual and augmented reality are also being tested for collaboration and meeting situations.

The environment or space in which a public encounter occurs can influence the citizens perception of their government. Lindgren et al. (2019) states that the shift to digital public services changes the nature of the public encounter by changing the when, where, and how of the interaction as well as what each actor does and the skills that are required to perform a task. In the case of the Norwegian Labor

and Welfare Administration (NAV), the digitalisation process has already led to decreased accessibility through non-digital channels (Helsetilsynet, 2022).

Several scholars point out that research on the effects of shifting the public encounter away from face-to-face interaction towards digital interactions and its implications for citizens perception of their government is not sufficient and in need of empirical studies (Bartels, 2013; Buffat, 2015; Lindgren et al., 2019). To evaluate the impact that ICTs have on the citizens perception of their government, a framework developed by Bannister and Connolly (2014) can be used. The framework proposes a taxonomy of public values for assessing the impact of ICT in the public service sector. The term value can be defined as "a mode of behavior, either a way of doing things or an attribute of a way of doing things, that is held to be right" (Bannister & Connolly, 2014). The values relevant for this study relate to the public sector and are therefore termed public sector values. The framework by Bannister and Connolly (2014) divides values into duty oriented, service oriented and socially oriented values and represents a core set of administrative values. An overview of these values is presented in Table I.

From a CSCW perspective the public encounter can be seen as a collaborative process that involves citizens and public officials. Public encounters are an example of practices that cross organizational boundaries and involve multiple stakeholders. It can be described with the boundary resources model developed by (Ghazawneh & Henfridsson, 2013). Boundary resources are defined as "the software tools that serve as the interface for the arm's-length relationship between the platform owner and the application developer" (Ghazawneh & Henfridsson, 2013). Gong & Li, (2023) have adapted this model to define e-government platforms where boundary resources "enable and stimulate collaboration among government agencies". Thus, the boundary resource model can also be used to define the interface for the relationship between citizens and public officials. These boundary resources ought to be designed to enable collaboration.

CSCW literature has investigated other cases where organizational boundaries are crossed with the help of technology, as for example assisted living technologies and care services (Procter et al., 2014) and navigating healthcare services (Gui et al., 2018).

Table I Proposed taxonomy of public values for assessing the impact of ICTs by Bannister &
Connolly (2014)

Duty oriented	Service oriented	Socially oriented
Responsibility to the citizen	Service to the citizen in his or her different roles	Inclusiveness
		Justice
Responsibility to the elected politicians of the day	Respect for the individual	Fairness
	Responsiveness	Equality of treatment and access
Proper use of public funds	Effectiveness	
		Respect for the citizen
Compliance with the law	Efficiency	
		Due process
Efficient use of public funds	Transparency	
		Protecting citizen privacy
Integrity and honesty		
		Protecting citizen from exploitation
Facilitating the democratic will		
		Protecting citizen security
Accountability to government		
		Accountability to the public
Economy/parsimony		
		Consulting the citizen
Rectitude		
		Impartiality

Objectives

This research aims to investigate the impacts of digitalization of the interaction
between state and public, also known as public encounter, on the citizens
perception of their government. More specifically the author wants to find out
whether the use of Information and Communication Technologies (ICTs)
influences how the citizen perceives their government and if so whether it is
possible to design these ICTs in a way that will foster a positive perception. The

citizens perception of their government can be evaluated by assessing a given set of public service values. The goal is to develop a framework which can guide the design and implementation of digital public encounters in a way that contributes to a positive citizens perception of their government. The research focuses on the Norwegian context by investigating the nature of public encounters between government institutions and citizens.

The key research questions of this PhD are:

RQ1: How does the use of ICTs in public encounters influence the citizens perception of their government with regards to public service values?

RQ2: How shall (digital) public encounters be designed to foster positive citizens perception of their government?

Methodology

This research project will investigate the public encounter, interaction between state and citizen, in different settings. It is a real-life, contemporary event which can best be studied through a case study.

Yin (2018) defines three conditions, (1) the form of research question asked, (2) the control the researcher required to have over the events, (3) the degree of focus on contemporary versus historical events, that relate to different research methods. A case study is thereafter recommended for research projects asking How? - and Why? - questions, where the researcher does not require control over the events, and contemporary events are studied (Yin, 2018). All three conditions are met in this project.

Different data collection methods will be utilized at different stages in the research. These methods include observations, interviews, and content analysis of related documents. Other forms of interaction with participants, such as meetings, workshops or focus group discussions, can be part of the data collection. Observations will be documented in field notes, while all interviews will be recorded. The data will then be analysed to develop a comprehensive understanding of participants thoughts, opinions, emotions, and experiences. A qualitative data analysing tool such as NVivo will be utilized.

The different stages of a case study research are plan, design, prepare, collect analyse, and share (Yin, 2018).

Other competing research strategies for this project could be a survey or ethnography. However, the growing implementation of e-government services and therefore increased number of digital public encounters are a recent and rapidly changing phenomenon which require new theories and concepts to understands its impacts on society. Such is difficult to acquire with a survey

which focuses rather on existing theories. An ethnography has a lot in common with case study research, however it is mainly based on observations for data collection and may use interviews as additional technique while the case study can be based on quantitative and qualitative data which compliments one another to shape a holistic image of the studied phenomenon (Suryani, 2008).

Findings to date and next steps

This research project has just begun, and no data has been collected to date and therefore no findings are present. The author is currently working on an extensive literature review to build the theoretical framework on. The literature review will show if the chosen framework by Bannister & Connolly (2014) is in fact suitable or whether other frameworks or metrics fit better. Furthermore, will the author get in contact with relevant groups to start collecting data for the first case study. The first case study will involve the Norwegian Labour and Welfare Administration and investigate their interaction with citizens within different spaces such as physical, digital, and potentially hybrid spaces. One interesting and potentially challenging aspect of this case study will be the involvement of end-user of NAV (citizens) and to generate data from this group. The author is interested to learn about other researchers experience on this topic and the methodological approaches that were used.

Contributions

My research is investigating the very specific interaction between citizens and public officials and how digital tools shape and influence this interaction. This interaction inhibits a special form of collaboration between the actors. My research will motivate discussions and insights around this special form of collaboration.

Furthermore, my background in urban planning with a focus on citizen participation and user centred design connects well to the main concepts in CSCW. While urban planning is looking at how people utilize urban spaces (collaboratively), CSCW is focusing on how people utilize technologies collaboratively. Viewing CSCW from an urban planning perspective, where social interactions and participation are at the core, can contribute to interesting discussions.

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Biography

Michaela Schmidt is a Phd candidate at the Department for Computer Science at the Norwegian University of Science and Technology (NTNU). Her research interest concerns the impact of digitalisation on society and on the societal aspects of sustainability.

Her background is in urban planning with a focus on citizen participation and user centred urban design. The current digitalisation of cities and urban environments, often presented under terms such as Smart Cities and electronic governments, are motivating the investigation of societal aspects of this transformation process.

Statement

My main motivation to attend the doctoral colloquium is to discuss my research topic as well as research approach and receive constructive feedback. Coming from an urban planning background I hope to get new insights from the field of CSCW and ideas on how to better connect my research topic to the concepts of CSCW. I am very interested in learning more about qualitative research in computer science.

'Data Saves Lives': Data Work in a Healthcare Business Intelligence Unit

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Abstract. Big Data and the digitalization of healthcare have encouraged a movement toward becoming data-driven. Although hailed as a solution to a plethora of challenges, the hype of Big Data, however, often oversees that data requires work – by humans. The emergent field of data work emphasizes these skilled but oft-invisible efforts required to make healthcare data-driven. Based on an ethnographic study, this project investigates data work in a healthcare business intelligence unit. The project's purpose is to identify the skills and tasks that constitute data work within the unit, as well as how healthcare data work roles and tasks change in the process. In this paper, I present findings from my project: I first describe the collaborative work in constructing standardized and reliable data products that are applicable across multiple sites; I then describe the necessary work conducted to implement and disseminate data products in local healthcare practices. Finally, I summarize my next steps and expected contributions.

Introduction

This project investigates data work ethnographically in a public healthcare Business Intelligence unit (BIU). The work presented here is part of a larger project that follows the call for investigations of data work in healthcare (Bossen

et al., 2019; Fiske, Prainsack, and Buyx, 2019) and explores the new knowledge and skills required to work with data as well as the effects of data (work) on professions, roles, and tasks.

While much attention has been paid to the benefits and challenges of Big Data and datafication of healthcare (Hogle, 2016), there is a dearth of studies on the required data work and the people conducting it (Bossen et al., 2019). Studies within the emergent field of healthcare data work, as well as in CSCW and CHI, emphasize the skillful but hidden work on and by data (Bossen et al., 2016; McVey et al., 2021). Among others, this includes studies of medical secretaries' role in achieving and maintaining high data quality (Knudsen and Bertelsen, 2022); how nurses use data to personalize care in remote monitoring of chronic patients (Grisot et al., 2019); and the emergence of new healthcare data workers such as medical scribes (Bossen, Chen, and Pine, 2019).

However, there is a lack of studies of occupations with data work as their primary task in healthcare, such as data professionals. Although Data Scientists have received much attention in general (Rothschild et al., 2022), only a few studies on other data professionals' work practices in healthcare have started to emerge (e.g., (Choroszewicz, 2022; Thakkar et al., 2022). This leaves us with an impoverished understanding of their work and how they influence and co-create data-driven technologies in healthcare. Hence, this project investigates BI developers' (BIDs) data work and explores how healthcare data work tasks and roles change with the introduction of BI data and technologies.

Methodological Approach

The project's ethnographic approach follows a long-standing tradition of workplace studies and ethnography in CSCW (Blomberg and Karasti, 2013; Randall, Rouncefield, and Tolmie, 2021) that aim to uncover and understand the often-invisible work, collaboration, and coordination that takes place in organizations. The study has been divided into three phases with different analytical focuses that, however, are coherent and overlapping: 1) An explorative investigation of the BIU staff's data work, 2) an investigation of the BIU's work with implementing BI technologies, and 3) two concurrent investigations where I revisit data work practices within the BIU and Healthcare professionals' data work with implementing and using BI technologies.

The investigations were conducted between January 2021 and March 2023. I initially interviewed two BI managers (1.5 hours) and 19 BIDs (14.5 hours). Further, I conducted 79 hours of fieldwork, following the BIDs' work practices. Lastly, I conducted 11 semi-structured interviews (6.5 hours) and participant observations (6 hours) with healthcare professionals, both clinical and non-clinical, who work with BI technologies in their respective departments.

In all three phases, field notes and photographs were taken, interviews were recorded and transcribed, and documents and artifacts were collected for analysis.

Analytically, the study employs a grounded theory approach (Charmaz, 2014) where data is coded and categorized inductively. Additionally, I draw on insights from data work studies and theoretical frameworks of CSCW and STS. In the following sections, I will shortly present the case and summarize the findings from the project.

Case: A Public Healthcare Business Intelligence Unit

The BIU is part of a regional healthcare system in Denmark. It repurposes and delivers data to five hospital units and other relevant departments within the healthcare sector. When established in 2015, it employed 16 people and serviced 290 users. It has since grown rapidly and today it employs more than 50 people and services approximately 4000 users. The BIU's setup consists of a data warehouse through which they integrate different data sources (electronic health records, medicine, HR, etc.) that is then 'wrangled' (Muller et al., 2019), curated, and visualized according to different subjects (e.g., 'Booking', 'Contacts', 'Diagnose Guarantee') in reports that can be adjusted for the specific departments and needs. All reports can be accessed by the regional healthcare staff through a dashboard called the BI Portal.

Findings

The BIU's strategy is to support the organization '... in delivering more welfare, better quality, higher impact, and greater sustainability for less money' (Internal BI strategy document) and 'save lives with data' (Interview, BI Manager, 2021). However, three of their challenges involve: How to create relevant and accurate reports to support work and decision-making; how to adopt users - especially in clinical practice; and how to make healthcare staff more self-reliant. Hence, their work areas can roughly be divided into two categories which however are entangled in their everyday practices: 1) Data warehousing and report development, and 2) training and user engagement to secure the implementation of BI technologies in clinical and non-clinical practices (Asbjørn Malte Pedersen and Bossen, 2021).

Data Work in a Healthcare BIU: Between the general and specific

The BIDs construct standardized data products that must be applicable at all hospitals within the region. Standardization is often a common approach in regional and national technology implementations which then have to be

configured to local practices (Ellingsen, Hertzum, and Melby, 2022). To ensure the relevance and accuracy of their products, the BIDs also allow for the specificity of different healthcare contexts. They, in other words, balance the general and specific aspects of data work practices through close collaboration with healthcare professionals and negotiations of data representations. In the following, I will present a central aspect of their data work which I have categorized as 'consolidating standards'.

Consolidating standards involves the construction of new reports and data sets which happens through various processes of standardization and negotiations. When new projects are initiated, it is the hospital management and BI board that decide which projects the BIU can advance with, and the ideas must be broadly applicable across multiple departments to be relevant. The BIDs then organize data and develop common definitions on which they base their reports. This corresponds to the notion of 'a single version of the truth' within BI and data warehousing: A curated data set that allows users 'to analyze and report on the same underlying reality' (Aspin, 2022, pp. 3). However, data is highly contextual and various departments may perceive a given phenomenon differently. Hence, they collaborate closely with domain experts from different departments (e.g., healthcare professionals, administrative staff, etc.) to figure out which key indicators to use and how to define certain phenomena (e.g., what counts as a new patient?). The BIDs and domain experts gather relevant information on registration practices, workflows, and challenges from the respective departments while negotiating how to accommodate and align differences.

However, errors may occur in data sets or reports, leading to negotiations and disputes about data between the BIDs and healthcare professionals. For example, patients missing from a list. If this happens, the BIDs must work out why the error occurred in the first place. Sometimes the healthcare professionals do not adhere to national registration requirements and sometimes they simply do not agree with the data representations. Other times, reports are faulty due to errors in data queries, changes in data type inputs, or the constructed logic of the data sets. Either way, these negotiations help the BIDs to ensure valid data representations over time which reflect the real-world experience of the healthcare professionals.

These collaborations and negotiations are imperative to overcome tensions between standardization and specificity when developing data technologies that must be both useful and reliable in multiple contexts. Additionally, these findings demonstrate how BIDs and healthcare professionals co-create new data standards. Following the argument of Muller et al. (2019) and Muller and Strohmayer (2022), I argue for more transparency of these BI processes, as they are an important aspect of how data and data-driven healthcare come to exist and are shaped.

Boundary Object Cultivation: The creation of 'smarter data workers'

What kind of data work is conducted to implement BI technologies? Drawing on Susan Leigh Star, I characterize the reports and data warehouse as 'boundary objects' (Star, 2010; Star and Griesemer, 1989) that can support cooperation across boundaries and be adapted to local conditions and contingencies. While it requires work to create these boundary objects, it is rarely enough to make them available; they must be implemented and used in practice. This also requires extensive efforts from the BIDs. In this regard, I have identified three categories of work ('mobilizing interest', 'building local capabilities', and 'local implementation') and propose to conceptualize these efforts as 'boundary object cultivation'. This notion designates how we cannot assume that boundary objects (in this case, BI data and technologies) spread easily, are self-evident, or are automatically put into use. The ground must be cultivated for boundary objects to grow and form the networks of cooperation they are created for (Pedersen and Bossen, Submitted).

Mobilizing interest involves arousing the interest of healthcare professionals through activities and artifacts. They promote the potential of BI at self-organized events called 'The BI Day'; they travel to different hospitals and advocate for the BI setup at 'BI Cafés' while helping new users get started at BI workshops; and they nurture their relationships with users through data culture, producing data related merchandise (e.g., T-shirts, cups, and fake tattoos) and organizing quizzes where healthcare departments can win prizes. These activities help the BIU make themselves visible to the healthcare staff, create interest in their setup, and communicate the potential.

Building local capabilities involve the training of healthcare professionals to become 'smarter data workers' who are more self-reliant. The BIU organizes training courses that produce 'BI Ninjas' (non-technical actors who can set up reports) and 'Data heroes' (technical actors who build reports and do data warehousing). These findings emphasize how BI reports are not self-evident, even when standardized and user-friendly, but require knowledge of data structures, filtering, sorting, and sense-making.

Local implementation designates how BI technologies disseminate when BI Ninjas and Data heroes work with and introduce them within their departments. Medical secretaries set up reports for themselves and other colleagues to support their work; a head physician introduces the reports to other clinicians while using them for management purposes; and a physiotherapist is granted access to the data warehouse to produce his own reports and projection models for the hospital. One key finding here is that these people often become ambassadors of the BIU, helping to champion, spread, and manage the BI technologies and use of data in their departments.

Next Step and Expected Contributions

I am finishing the last phase of fieldwork, gathering empirical data on data work in the BI unit and different healthcare departments. Currently, I am preoccupied with three questions and contributions.

First, how are challenges of invisibilities overcome in BI data work? During my last round of fieldwork, I identified several challenges related to public-private relations in BI data work: Where to locate data? How to get access? And how has data been transformed? While we often think of Danish healthcare as a public institution, it is highly entangled with private organizations which form and take part in the ever-growing healthcare infrastructure. This obscures certain aspects of data that the BIU attempts to overcome.

Second, how do healthcare BI technologies support clinical and non-clinical work? I am currently investigating how healthcare professionals work with BI technologies in their local context, which skills are needed, what challenges they encounter, and how they solve these. Further, I am interested in the work conducted to appropriate new technologies within their local context.

Third, which kind of work does healthcare BI support and for what purposes? So far, many empirical studies demonstrate how Big Data and BI can succeed in healthcare, supporting management and clinical decision-making. However, recent discussions on healthcare data work highlight the implications of data-driven technologies for professions and suggest focusing more on the ethical aspects of these efforts (Green et al., 2022). I hope to contribute to these discussions with a nuanced understanding of what work BI supports while suggesting future potentials.

Acknowledgments

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The state of readiness and attitudes toward adoption and collaborative use of AI in the oncology discipline in Sweden

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Abstract. The need to exploit the strengths of both humans and AI for increased productivity has been highlighted in literature, but AI adoption is still low. Considering the potential of AI as both a collaborative tool and a collaborator in healthcare, I address barriers and facilitators to adoption, perceptions and attitudes of stakeholders, knowledge gaps, and how the design aspect might be impacted.

About the author

I am a Ph.D. student in Information Systems, Karlstad University, and my research area is eHealth. I have a broader interest in human-AI collaboration, and my research focuses on the state of readiness for the adoption and use of AI systems in oncology. I have an interest in exploring the uptake of AI systems and attitudes of stakeholders towards the future of collaborating with AI agents in certain aspects of care, and some possibilities for overcoming known barriers. My previous research has focused on multidisciplinary team meeting records in cancer care. I have also collaborated in other research work on distributed participatory design, and COVID19 effects on recreational activities. I am still in my first Ph.D. year therefore

the research is still in its early stages. Nonetheless, I believe feedback and discussions at the colloquium would be extremely valuable.

The research

Artificial Intelligence (AI) systems have come with great possibilities for healthcare, possessing human-like intelligence and ability to perform complex functions, handle large amounts of data, act autonomously, and learn and adapt to their environment. These AI systems are based on machine learning techniques which are grounded on algorithms and statistical models, and possess capabilities to handle data more efficiently, and solve given problems (Mahesh, 2020), thus machine learning models handle situations according to the algorithms in place and the data with which they were trained. Agency refers to the ability of AI to perceive and act autonomously and in a useful way within its environment (Mahesh, 2020).

Despite AI's inception being several decades ago, its adoption in various organizational contexts, including healthcare, is still in its infancy. The claims and hype in many media communication sources suggest that AI has been widely adopted, if not at least promising far more capability than literature proves feasible at this point. For example, Chua et al. (2021) highlight that despite the demonstrated benefits of AI in oncology, the adoption of AI tools is not widespread, and barriers to adoption exist. Oncology is an interesting field of study as it is faced with a burdening disease and has received considerable attention in the development of AI systems covering the areas of prediction, diagnosis, and treatment. Indeed, intelligent systems are successfully handling some repetitive and complex tasks. However, in practice, some contexts have shown that AI is not a replacement to human intelligence, and this has given rise to the discourse on AI augmenting human intelligence and tasks, not replacing. While AI machines can provide high processing speed, recognize complex patterns, handle complex computations and large amounts of data, and have predictive capabilities, humans remain superior in being flexible, creative, intuitive, as well as making context-specific judgements (Dellermann et al., 2019). The differing intelligent capabilities of humans and AI complement each other. Healthcare is a good example of why humans ought to be kept in the loop amidst AI developments. However, the increasingly agentic nature of intelligent systems highlights their ability to take control and responsibility over certain tasks, suggesting that HCPs must relinquish certain tasks and maintain others, or take over others that may be of a different nature.

The advancements in cancer care and aid for healthcare professionals that AI promises may be viewed positively and encourage adoption. However, in many cases, these technologies are still met with skepticism and apprehension which may result in low adoption and use. Interactions between humans and intelligent systems bring about new ways of working, highlighting a need to further investigate organizational impacts, issues of agency and control may ensue, and reservations owing to lack of trust, issues of accountability, and concern for privacy and security may contribute to slower adoption rates. Some AI solutions have been questioned in practice, as they tend to be limited in generalizability, are beset with several

ethical issues, and still fall short when they need to handle common sense issues as humans do (Riedl, 2019).

Designers must keep in mind the social aspects of the environments in which the designed intelligent systems will work, and possible unintended consequences must be considered. Possible solutions to highlighted barriers point to relooking how AI systems are designed and take an approach that brings together interdisciplinary and participatory means that will take AI in the direction the stakeholders need.

Research Aim

The aim of my research is to explore the state of readiness for adoption and use of, and particularly collaboration with AI technologies by healthcare professionals in oncology, and steps that can be taken towards overcoming barriers. My research primarily focuses on HCP-facing intelligent technologies that use machine learning. Since machine learning is most suitable for AI models that learn from their environment and are evolving over time, it lends itself more to uses that involve human interaction. However, the agentic capabilities of AI systems and the processes they are designed to perform go beyond interaction or even collaborative tools, but morph into collaborators themselves. Then a question that arises is whether AI systems can be viewed as partners in a healthcare process and workflow. For example, one area of cancer care, the meeting of the collective of professionals to discuss patient cases, may benefit from the inclusion of AI in the decision-making process, but research is yet to fully explore how these 'decision makers' can be viewed and how they change the dynamics of these meetings.

Given the need to better understand whether Swedish healthcare institutions are ready for collaborative AI in their oncology teams, identify the barriers and facilitators to adoption, and propose ways around the identified barriers, the following research questions will be addressed in separate studies that contribute to the project:

RQ1: What is the state of readiness for the adoption and collaborative use of AI systems in oncology?
- 1a: What views do Swedish healthcare managers hold about the adoption of AI and types of ML-based AI systems designed for use in oncology?
- 1b: What are the attitudes of healthcare professionals toward the adoption of AI that can be used collaboratively in cancer care?
- 1c: From the design perspective what can facilitate or hinder the inclusion of stakeholders in the design of collaborative AI systems?
- 1d: To what extent does the AI training given to healthcare professionals prepare them for coordinating work tasks between themselves and AI systems?

RQ2: What solutions can effectively overcome the barriers to facilitate the adoption of collaborative AI systems?

Methods

This research falls within the boundaries of human-AI interaction and investigates computer supported collaborative work from a different angle, where intelligent systems do not only aid collaborative work but become collaborators in themselves. Ethical approval will be sought from the Ethical Review Board in Karlstad University and the project will be formally registered.

This project is exploratory in nature and will use an interpretive qualitative approach. Interpretive qualitative research is best suited for research inquiries that seek to understand how people make sense of certain phenomena based on their experiences (Merriam et al., 2002). Following a literature review to get a comprehensive knowledge of related material in the existing body of knowledge, data will be collected from healthcare managers through semi-structured interviews, healthcare professionals (HCPs) through a survey, AI developers in Sweden-based AI labs through semi-structured interviews, and university lectures within healthcare departments through semi-structured interviews.

Sweden has been selected for this study because of the strides it is making with regards to technology advancements in healthcare. Sweden's eHealth vision 2025 is to digitize social and healthcare services, by utilizing the opportunities presented by information and communication technologies to equip individuals and providers and achieve good and equitable health and welfare (eHalsa2025, 2020).

However, if data from the Swedish studies show that it would be interesting, comparative studies with other countries may be embarked upon. Statistical and thematic analysis will be performed based on the type of study conducted within the project. A data management plan for this project outlines the relevant information regarding data ownership, storage, access, and how it aligns with the FAIR data principles.

The initial study comprises of semi-structured interviews with the heads of oncology departments in various hospitals, who while giving their views on AI, can be expected to elucidate on the barriers and facilitators to adoption of collaborative AI systems in oncology settings in public health institutions. Potential participants will be identified and contacts obtained through hospital websites or direct visitations to hospital receptions. Emails and phone calls will be used contact them to request their participation. The interviews will be carried out in person, but web-based options will be offered if this is preferred by the participant. The interviews would last approximately an hour and would be recorded following a permission request to do so being granted by the participant. A consent form and information letter will also be given to participants regarding their participation in the study which is voluntary. The interview will proceed only upon this consent. The recorded interviews would be transcribed verbatim and any identifying information will be pseudonymized. The interviews will then be coded, and the codes used to identify relevant themes. The results will be disseminated through academic publication.

Contributions

The level of AI use in society and other industries suggests that these technologies will become an indispensable part of our futures, and the healthcare industry stands to gain from leveraging such technologies. This study would contribute to the body of knowledge an assessment of feasibility of adopting collaborative AI in oncology by addressing social aspects that may be overlooked when ready-made AI systems that promise are brought into the industry only at the stage of evaluation and use. This study will also highlight issues that remain a hinderance and clarify on the development of AI systems that need to take sociotechnical view from as early as the design phase.

Ethical challenges and limitations

Though surveys and interviews are valuable methods of data collection, studies around collaboration between human and AI can be better informed through observation of real-life application. In other cases, observations during system evaluations can be informative. In real-life applications researchers have a possibility of being exposed to patient health data and this poses an ethical issue. On the other hand, AI evaluations by HCPs outside the real-life application are not common, and would not give results that are true to the experience gained within the working context.

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Knowledge and Expertise Sharing for Coordination in Digitalization Production Contexts

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Abstract. In the process of ongoing digitalization of the production world, manufacturing companies are increasingly faced with the challenge of using new technologies to maintain their competitiveness. In this context, knowledge and expertise sharing is becoming more and more important, which may increase the requirements for articulation and coordination in cooperative settings. CSCW systems can potentially support these cooperation processes by promoting interaction between employees and supporting the formation of awareness. However, awareness can be related to factors of leadership and motivation and influence required learning processes through ongoing digitalization as well. As the use of CSCW systems affects technical, environmental and organizational factors of group work, knowledge and expertise sharing at different and between hierarchical levels also needs to be considered. Furthermore, group performance often is influenced by social forces and norms that act as group effects on group behavior. This is a qualitative research to explore the relationships of awareness, leadership, motivation, and learning processes and their influence on knowledge and expertise sharing in hierarchies, taking into account social processes in cooperative settings. The research focus is on small and medium-sized companies of the metalworking industry, which are in constant digitalization.

Introduction

Across the years, companies in the industrial sector have increasingly been undergoing a revolutionary transformation through digitalization of their processes. This trend is supported by the growing use of cyber-physical-production-systems and the expansion and use of the Internet of Things (Carvalho et al., 2018; Hoffmann et al., 2019; Kagermann et al., 2013; Schwab, 2017) to design digital work environments, in which new technologies are becoming increasingly important (Carvalho et al., 2018; Hertel, 2015; Hoffmann et al., 2022; Mura et al., 2016; Rijswijk et al., 2020). This in turn requires a strong focus on knowledge and expertise sharing (KES), which can be considered a strategic resource to achieve potential competitive advantages (Grant and Baden-Fuller, 2004; Watson and Hewett, 2006).

In addition, this highlights the significant role of coordination of people, information, and organizational units in cooperative settings, where interdependencies between employees or organizational units, such as the use of the same resources to achieve their goals, occurs (Schmidt and Bannon, 1992; Sudweeks and Allbritton, 1996). Here, awareness is particularly required, which can influence cooperative interactions by mediating between the three dimensions of cooperation, communication, and coordination (Fuks et al., 2008; Mantau and Barreto Vavassori Benitti, 2022; Steinmacher et al., 2013). In order to support these processes more efficiently, CSCW systems have been designed over the years to promote coordination, communication, and awareness in organizations to enhance cooperation among employees (Chen et al., 2019; Farshchian, 2019; Haines, 2020; Luther and Bruckman, 2008). One strand of CSCW research has placed a special focus on social behavior in KES (Ackerman et al., 2013). This is based on information spaces in which knowledge is gathered and made accessible (Pipek et al., 2012).

However, technology mediated cooperation also influences the development of social forces and norms in work groups (Kamel and Davison, 1998; McKinlay et al., 1999; Sudweeks and Allbritton, 1996). These in turn lead to certain behaviors, which have already been extensively discussed in different bodies of literature under the rubric of group effects (Ingham et al., 1974; Rose, 2011; Suleiman and Watson, 2008; Wajcman and Rose, 2011).

Research Context and Questions

This research project focuses on KES and requirements for articulation and coordination in the context of digitalization in manufacturing companies. In these, group work is often found in a cooperative setting, which forms the framework for cooperation and is considered as an important factor for the organization and

development of social processes (Schmidt and Bannon, 1992; Sudweeks and Allbritton, 1996).

The dynamics of group performance usually present themselves as complex and are subject to various influences by the group members. These include not only the feeling of belonging to the group (Blauner, 1964), but also situational awareness of one's own environment (Olson and Olson, 2000) and access to the communication behavior of other group members (Whittaker, 2003).

Awareness requires having understanding of the activities of others in the context of one's own task (Dourish and Bellotti, 1992). It does not only refer to hard facts; instead, it be understood as a social construct (Gross, 2013; Hancock et al., 2009; Morrison-Smith and Ruiz, 2020), in which motivation is implicitly considered as an outcome of awareness (Haines, 2020).

Furthermore, Atzenbeck and Hicks (2008) showed that awareness can have a positive impact on motivation and cooperation. Especially in the case of cooperation across spatially and temporally distances, technical support is helpful to compensate lack of awareness (Bardram and Hansen, 2010). For these use cases, there are already various systems that can be used cooperatively, but they still show deficiencies in the support of mutual awareness (Niemantsverdriet et al., 2019). Therefore, it is important to identify possible solutions within CSCW that help to compensate for the lack of awareness even more.

Within CSCW a number of constructs have been devised to support cooperative actors with cooperation challenges. Among them are common information spaces, coordination mechanisms and articulation spaces (Boden et al., 2014; Schmidt and Bannon, 1992; Schmidt and Simone, 1996). Also, many and various digital solutions have been explored in the field to promote effective coordination, KES, and successful cooperation (Balakrishnan et al., 2010; Bardram et al., 2006; Boden et al., 2014; Dabbish and Kraut, 2008; Goyal et al., 2014; Hoffmann et al., 2022). Nevertheless, the potential of digital systems to meet these requirements often cannot be fully exploited (Carvalho et al., 2018; Hoffmann et al., 2019; Mura et al., 2016; Niemantsverdriet et al., 2019). Especially factors of individual behavior in groups that influence the effectiveness of CSCW systems demand a deeper analysis (Carvalho et al., 2022).

Behavioral coordination also poses a particular challenge. Among other things, this can be influenced by motivational reasons of the employees and thereby has a direct impact on articulation work and thus the benefit of KES. In addition, it must be taken into account that the use of CSCW systems can also affect technical, environmental and organizational factors of group work (Cornell et al., 1989), which is why interactions between group members at different hierarchical levels must also be considered (Schmidt, 1994).

Regarding this, one particular issue that drew attention of past CSCW research is the role of leaders in information flows. Through their communication capabilities, they have a significant influence on the formation of awareness and

thus on the quantitative and qualitative performance of a group (Ehrlich and Cataldo, 2014). Moreover, in a study on digital group work, Haines (2020) found that, contrary to previous studies, a regular flow and exchange of information promoted by leaders can enhance the awareness of a group and increase its motivation and performance in various work contexts. Therefore, companies need to develop appropriate strategies that take into account the specific factors influencing the exchange of information in hierarchies (Pratt and Cakula, 2020). Particularly considering that effective communication is a key factor in motivation and is impeded by technology-based channels, it is important to generate support mechanisms for leaders to exchange knowleldge and expertise at different and between hierarchical levels (Cakula and Pratt, 2021; Pratt and Cakula, 2021).

However, this requires a continuous learning process in organizations in order to constantly adapt the development of cooperation to the changing challenges of digitalization (Redmiles et al., 2007). Nevertheless, the learning material used in the manufacturing industry rarely meets the requirements of the respective workplaces (Weinert et al., 2022). In addition, the ongoing digitalization has increased the complexity of manufacturing processes (Fuller et al., 2020). This in turn affects the required skills and knowledge of employees and thus their need for learning (Weinert et al., 2022), which increases the importance of KES and challenges the formation of awareness.

Furthermore, technologies should not only be seen as a positive contribution to group cooperation. CSCW systems can equally lead to negative outcomes in a socio-technical environment (Carvalho et al., 2022; Neale et al., 2004). In addition, group effects lead to the fact that, contrary to the frequent assumption that group work leads to enhanced productivity, people perform less collectively than the sum of their individual performance (Ingham et al., 1974; Wajcman and Rose, 2011). These phenomena also occur frequently in cooperative settings of production work and can help to explain the impact of ongoing digitalization on cooperation in production.

To respond the gap in the literature, this Doctoral research address the following research questions:
(1) How is awareness related to leadership and motivation and influences the development of social processes referrent to KES within ongoing digitalization contexts and vice versa?
(2) How does KES work at different and between hierarchical levels and how can negative group effects be possibly mitigated when knowledge and expertise is shared in the context of digital processes?
(3) How does awareness impact learning processes in ongoing digitalized production environments and what are the implications for the development of social processes in cooperative settings?

Research Procedure and Methodology

To answer the above mentioned research questions, a series of qualitative studies will be conducted. This approach fits the purpose, in that it allows for deeper understanding of the socio-technical issues (Wulf et al., 2018). As an instrument for data collection, semi-structured in-depth interviews will be conducted to give participants the opportunity to deepen their views and understanding of specific topics (Hermanowicz, 2002). Subsequently, the data will be thematically analyzed according to Braun and Clarke's (2012) approach.

The recruitment of the study participants will be based on purposive sampling (Bryman, 2012) and will consider employees of different hierarchical levels. The interviews should preferably be conducted in German small and medium-sized companies of the metalworking industry that are in an ongoing digitalization process, as they represent the industrial structure of our region.

Similar to what has been previously reported in the literature (Mura et al., 2016), in the metalworking industry, the workplaces of most participants are expected to be characterized by physical and noise-intensive activities that take place while handling different materials on various machines. Also, various sources of danger, such as forklift traffic and cranes (Patil et al., 2019) may play a role. This will require protective clothing, such as gloves, helmets, or even heat protective clothing, for most of them. These measures serve to ensure safety, but hinder the use of simple communication tools such as pens, keyboards, small switches, or headsets (Mura et al., 2016). Furthermore, the workplaces of the study participants may be spatially separated from those of their colleagues, which complicates direct personal contact between the employees.

Moreover, it is not uncommon for production employees to interrupt their work to retrieve work instructions or necessary information from systems (Evans et al., 2017) or to coordinate tasks within their group (Carvalho et al., 2018). In addition, the work content of participants may also vary as they are faced with changing tasks. This suggests some socio-technical challenges for cooperation, especially regarding articulation as the base of coordination and KES in cooperative settings. Therefore, the studies will focus on aspects of KES and how employees experience the ongoing digitalization of their workplace and how it affects their work practices.

Research Contributions

This research aims to contribute to CSCW by providing an account of how KES is affected by social processes in cooperative settings in the context of digitalized processes. In particular, the effects of the relationships of awareness with leadership and motivation as well as changing learning processes in the context of ongoing digitalization of work processes and the specifics of KES in hierarchies will be

considered. It is expected that the current state of the art in these topics can be advanced through a deeper understanding and that relevant information for implementation in practice can be gained.

Acknowledgments

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Designing Awareness Tools for Psychological Well-Being in Collaborative Work Environments

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Abstract. The work practices and tools supporting them are rapidly shifting to hybrid, making computer-supported collaboration more and more salient. Because of the novelty of this modality and imposed pressure to perform, employee well-being is at risk. Awareness support can be an empowering solution when designed in line with human-centered values and well-being as an objective. This thesis investigates how awareness tools can support the psychological well-being of people working together by enabling self-reflection and self-regulation. First, it aims at consolidating knowledge about the roles of awareness support in hybrid contexts. Second, based on empirical research, the thesis strives to derive the design guidelines of awareness support tools that improve the well-being of the employee collaborators. Third, it explores the opportunities to bridge the experience-centeredness of UX and orientation on social practices of CSCW.

Doctoral research overview

Research motivation

How much of the data collected through collaborative technology is beneficial to office workers as end users of such systems? The working processes are rapidly shifting to hybrid modalities, accelerated by the globalization and response to the recent COVID-19 pandemic, therefore we are more and more dependent on collaborative technology for successful collaboration (Yang et al., 2022; Duckert et al., 2022). The data collected through collaborative technology may serve to provide awareness to the users (Gutwin and Greenberg, 2002) about the work environment, others, and self. However, with what goal are these technologies designed and which underlying values do they embed? The workplace is an environment where the tensions are present between different stakeholders. The shift to hybrid incited the organizations to impose workplace surveillance measures, e.g. productivity measurements. Hence, tensions are present between the workers claiming their rights to privacy against surveillance and organizations striving for productivity. Meanwhile, focus on employee experience research is gaining traction (Simsek Caglar et al., 2022). One of the central notions is well-being at work: fulfillment of psychological needs of an individual and meaningfulness of experiences (Mekler and Hornbæk, 2019). How can collaborative technology support not only collaboration but also our well-being in the newly normal hybrid settings? Awareness support, an element traditionally present in the collaborative technology which enables contextual information and facilitates its consolidation (Gutwin and Greenberg, 2002; Niemantsverdriet et al., 2019), can be such a solution. A recent systematic mapping study represented awareness in three dimensions: collaboration, workspace, and contextual (Mantau and Benitti, 2022). Awareness can be supported on different levels: through mirror, metacognitive, or coaching systems (Jermann et al., 2001). My research investigates how awareness tools can support the psychological well-being of people working together.

This research project is a part of a research block grant carried out in partnership with an industrial and governmental partners. This partnership is a unique opportunity to conduct research and test the developments in-situ in work scenarios.

Research questions

The main research question is as follows:
How can we improve collaborative experiences and collaborators' well-being through awareness tools in hybrid settings?
I aim to answer this main research question through the following sub-questions:
- RQ1 – How to achieve a comprehensive measurement of collaboration experience (what is the beneficial combination and triangulation of

subjective, objective, post hoc, real-time measurements, physiological and workplace sensing)?

- RQ2 – What are the ethical and cognitive implications of introducing collaboration experience measurement and awareness tool for the collaboration and collaborators?
- RQ3 – How might we design a collaboration awareness tool that can support collaborators' well-being?

Methodological approach

Designing for the workplace context implies consideration of multiple stakeholders (employees, managers) and systemic factors (organizational culture, domain, existing social practices, and ecologies (Korsgaard et al., 2022)). The presence of power dynamics puts psychological well-being of employees at risk, hence this environment demands special considerations.

First, I am exploring the meaningful indicators of collaboration through empirical research and literature review (RQ1). These indicators should be linked to metrics and measurements techniques. I thus study the prerequisites that make an indicator and related measurement suitable to be used in a collaborative work situation. As a first step towards this goal, I conducted an exploratory diary study and qualitatively analyzed the individual interviews after the diary distribution (study 1). Then, having chosen the measurements, I envision the ethical and cognitive implications of such experience measurement/awareness tool being introduced, using methods such as design fiction, design workshops, focus groups, questionnaires, vignette studies (RQ2). Finally, I aim to conceptualize and validate the awareness tool and monitor its adoption through the longitudinal user studies (RQ3).

Research to date

Study 1: Eliciting meaningful aspects of collaboration through a diary study

Awareness support has become a standard requirement for designing collaborative tools (Niemantsverdriet et al., 2019). However, the design choices are typically made in a top-down manner, without active decision-making from the users. Personal informatics approach (Li et al., 2010) enables collecting and reflecting on meaningful data. To address RQ1 and to gain insights about meaningful aspects of collaboration to be tracked, I have conducted an exploratory diary study building on personal informatics approach. In this study we explored the preparation stage of self-tracking (Li et al., 2010) by inviting 15 office workers to identify meaningful aspects of their collaboration experience and note them down in a notebook for two weeks. We conducted individual semi-structured interviews with participants to determine and reflect on metrics related to their collaboration experience (see the elicited elements in the Table I). The interview explored the

following topics: (a) the entry points into the selected elements of collaboration, (b) the meaningful elements and the narratives that inspired them, (c) implications of tracking such as privacy and the impact of such practice on the participants and their collaborations. The data codebook deductively builds on the collaboration elements identified by Anderson and West (1998), Patel et al. (2012), Marek et al. (2014). The other themes were identified deductively following the interview questions but inductively coded regarding their content. This research contributes new insights into employees' motivations and proposed metrics for tracking collaboration, encompassing personal, social, and organizational aspects of collecting and sharing this data. Even on the low-scale, the study revealed how diverse the perceptions of the participants are. This highlights the benefits of co-design to better understand the people's values and support their needs prior to the tracking (or to awareness support implementation). This research was published and presented as a Late-Breaking Work at NordiCHI'22 (Lushnikova et al., 2022). My first full paper is currently under revision.

Group	Subgroup	Examples of collaboration aspects elicited in the study
Task-orientation	Contribution to task	Speaking time during a meeting, N of mistakes found by a teammate
	Outcome of the task	N of projects successfully finished, KPI (N of articles published), result quality
	Productivity/Efficiency	Flow, focus on planned tasks, improvements, meeting efficiency, N of meetings useless/relevant, N of people in a meeting
Relation-orientation	Interdependency of collaborators	Learning from each other, trust to delegate, reciprocity of help
	Values, norms, attitudes	Impact of hierarchy, transparency, discrimination, inequalities, the required level of diplomacy
Individual-orientation	Emotions and feelings	Mood, emotions, hormones, level of tiredness, frustration, regret, feeling overwhelmed, stress/physical state, level of fun, N of laughs, impact of personality, awkwardness
	Psychological needs	Feeling useless, belonging, feeling in sync, connectedness, level of competence, level of autonomy
Time-orientation		Deadlines respected, scheduling, time spent efficiently, time pressure, time spent collaborating/availability for collaboration, time overlap, time spent preparing a meeting, (a)synchronicity of work
Space-orientation		Space connection (door open/closed), space structure, impact of space (informal collaboration versus focused work)

Table I. Meaningful collaboration aspects elicited in the study 1.

Study 2: A systematic literature review of methods used for measuring collaboration in the context of awareness support tools

As a second and main contribution to RQ1, I am conducting a systematic literature review. Recent systematic literature reviews on the topic of awareness support in collaborative systems (Lopez and Guerrero, 2017; Canché and Pino, 2021; Mantau and Barreto Vavassori Benitti, 2022) focus rather on the ubiquitous mechanisms for providing awareness, approaches to evaluate awareness or techniques to elicit requirements for collaboration systems. My SLR would contribute to understanding the (novel) roles of awareness support in hybrid work and the design values surrounding the solutions. The research questions for this study are the following:

1. What are the indicators of collaboration used in the awareness tools?

2. What are the opportunities and challenges arising from hybrid work contexts (Neumayr et al., 2022) with regards to awareness tools?

3. What type of feedback (Jermann et al., 2001) is provided to the collaborators (e.g., mirroring, metacognitive) and under which form?

4. How does the feedback provided to the stakeholders, in particular the collaborators, impact their perceived well-being?

5. Are specific design values (Friedman et al., 2019) (e.g., human welfare, privacy, trust) explicitly mentioned in the reviewed studies?

The search sources of this review will include the research papers published in the past 10 years and published on IEEE Digital Library, ACM Digital Library and Springer Link as the most representative databases for the research community.

To complement the academic findings of this SLR and address RQ1 in a more comprehensive manner, I will conduct a benchmark of the awareness support tools currently available on the market.

Next steps

The next steps of my research will focus on a series of empirical studies and research-through-design (Dalsgaard, 2010) explorations addressing RQ2 and RQ3. While presented in a sequential order, some studies will be conducted in parallel. They will focus on the data visualization aspect of the awareness tool design and its impact on the experience, the co-design of the awareness tool, and longitudinal observation of the implemented awareness tool (e.g., in the co-working spaces).

Study 3: Longitudinal studies of awareness tools use

To address RQ3, I confront the implementation of an awareness tool with the group work setting. I intend to use the tools commercially available on the market

(e.g., Speaker Coach by Microsoft or Read.ai available as an application for video conferencing tools). I will conduct observations in a group work setting with two between-subject conditions in a series of group work meetings. In the first condition, the group will use the collaboration awareness tool. After the session, the participants will report their collaboration experiences through created questionnaires which will capture their self-reported experience with the tool (e.g., usefulness, acceptance, meaningfulness). I will conduct a focus group with the participants to elicit their individual and group perception of their collaboration experiences and the awareness tool intervention. I will control for the purpose of the group work meeting and the organization roles (employee, manager) of the participants. In the second condition (control), the group will work without the awareness tool. Data collection process is identical. As a follow-up to this study, I would use the same experimental design but confront the users with the imagined collaboration awareness tool implemented through the Wizard of Oz method; I would draw on the results from first step and on the SLR study to select the metrics for the tool.

This study along with the SLR will allow me to assess different types of collaborative data which can be used in awareness tools.

Study 4: Psychological ownership of collaborative data: implications for collecting and sharing

In this empirical study I plan to address RQ2, namely the implications for collaboration experience measurement and awareness tool implementation. I will draw on the concept of psychological ownership (Dawkins et al., 2017) applied to the collaborative data. Psychological ownership (PO) refers to the sense of ownership, a cognitive and emotional state of a person towards a target, which can be tangible like an object or a person, or intangible like a concept (data), organization or community. Design of awareness tools implies collection (in a manual or semi-automated fashion, or through sensors already integrated in the technology) and sharing (visualisation, embodiment, wearables etc.) of the data. Communities like CSCW and personal informatics already study attitudes of people towards sharing their data and implications for designing awareness tools (e.g., Markopoulos (2009); Häkkilä et al. (2020)). However, the concept of psychological ownership could add explanatory power, provide opportunities for generalizing results and inform design decision-making by explaining reluctance/willingness regarding sharing different types of data, with different groups of stakeholders. The research questions are the following:

1. How do data characteristics influence the sense of PO?

2. How do PO and interpersonal relations interact with the attitude and responsibility towards data (sharing, consulting, tracking)?

3. How can PO impact attitude towards different modes of data collection (manual, automatic)?

4. In what cases can PO be an enabler or barrier to sharing the data?

I plan to collect the data in a form of a questionnaire combined with vignettes. The questionnaire content will be based on the findings from the previous studies. Conducting the study on a large-scale will allow me to verify the validity of the results.

Study 5: Exploration of value tensions through speculative design

Using a speculative design approach (Bleecker et al., 2022), I aim to explore the value tensions surrounding an awareness tool implementation in the workplace (addressing RQ2). The experience monitoring and data sharing presents a challenge that can be both beneficial for the direct users and detrimental to their privacy and autonomy. When value tensions are left unaddressed, consequences can include lack of appropriation by the groups who are at a disadvantage or even system sabotage. In the preparatory step, I identify the stakeholders, their values, and value tensions that can arise between those, using the methods rooted in Value Sensitive Design (Friedman et al., 2019; Miller et al., 2007). In the next step, the design fiction based on the value tensions is created with user experience designers as participants. The resulting fiction artifacts will be both showcased to trigger critical reflections, and deployed in a relevant context to obtain contextual feedback from target users. This study will bring about the question of the accountability of the designers and allow reflection on the consequences of design choices.

Expected contributions

The contribution of my thesis is three-fold. First, it aims at consolidating knowledge about the roles of awareness support in hybrid work contexts. Second, the insights gathered through the studies will be used to derive implications for practice, under the form of design guidelines for awareness tools that improve the well-being of the collaborators. Finally, it explores the opportunities to bridge the practices of UX (and the inherent relative individual considerations around psychological needs and well-being) and CSCW (level of social practices).

Personal background

After a Bachelor's degree in Psychology from Saint Petersburg State University (Russia), I worked for five years in the IT industry for international companies such as Uber and Wrike, a SaaS company that creates collaborative project management software. I wore different hats, from a support specialist to a project manager to a data analyst. This richness of experience allowed me to build on my soft skills, such as empathy, problem-solving, and communication with different stakeholders, and hard skills, such as data analysis and visualization.

To reorient my career to the user experience field and leverage my background in psychology, I obtained a Master's degree in Cognitive science and ergonomics from the University of Bordeaux, France. I concluded my Master's studies with a research internship at the HCI research group of the University of Luxembourg. I designed and executed a mixed-method user study that applied Self-Determination Theory to the UX evaluation of digital museum interfaces. The resulting paper is currently under revision.

Attendance expectations

Participation in the doctoral colloquium of ECSCW is a valuable opportunity to receive feedback from the community, DC chairs and peers, regarding my approach and methodology, challenge my assumptions and enrich my perspectives. This is especially relevant since I join the CSCW community with a psychology and UX background. Specifically, I will welcome feedback on the methods and research questions outlined for the current and planned studies, and reflections on bridging UX and CSCW perspectives. I will be equally curious to learn from others about their experience conducting longitudinal studies, which allows witnessing how social technology adoption unfolds and ensuring the ecological validity of the contributions.

My educational and professional background will benefit my peers during the DC. My knowledge of psychological theories, experimental design, and data analysis approaches (quantitative and qualitative) can be helpful for those seeking feedback in planning and conducting studies. Furthermore, my experience with UX methods can benefit those specifically interested in conducting user studies, including living lab deployment. At my university, I regularly participate in the interdisciplinary doctoral consortia of our research team and my doctoral training unit. Therefore I am capable of providing feedback to my peers who come from different backgrounds. Finally, I will be ready to bring to the table my experience in IT and research to reflect together about the academia-industry partnership and its implications for research.

Acknowledgments

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PhD short description

This PhD project aims to explore how economic value is generated by data in data-driven technologies and the role of contextual and informal social relations in these valuation processes. Conducting ethnography in existing socio-technical networks 'in the wild', this PhD situates its focus on the healthcare sector. This project aims is to explore how the existing data practices, from the micro level of the data- practitioners to the mezzo level of the data stewards, construct value propositions for the ways data value is traded and regulated by the policymakers. Ethnographic fieldwork for this PhD research has already been conducted in two northern European companies in the Health Tech Industry. Further research is planned to be conducted in the public and private healthcare sectors in UK, Denmark and Greece.

Bellow, please do find the articulation of the PhD research in three studies. Study 1 and Study 2 have already been conducted and are about to be published. Study 3 is partly ethnographically conducted.

Study 1

The Logics of Data Quality: Challenges in Creating High Quality Data for Algorithmic Systems in Healthcare

Data quality is an important consideration in the development and deployment of algorithmic systems in general but especially in the healthcare domain. However, the process of achieving appropriate data quality is a source of active debate. CSCW researchers have debated challenges of data work, data annotation and data quality, proposing a range of different considerations, approaches, and points of contention. In this paper we present findings from an interview study of data creation approaches in two health technology organizations. Taking the traditional

dimensions of data quality - accuracy, completeness, consistency, and timeliness - we investigate how these dimensions are contested and achieved. We find that each of these dimensions encapsulates a logic of practice and contestation to arrive at something that can be termed a quality dataset. For each logic we analyse its imagined ideal features and the implications of failing to achieve these, and then consider the contestations and paradoxes emerging from the intended practices to achieve it. As the goal of the process was the creation of training data, we highlight the implications and the dependencies amongst the processes of different logics as our participants describe the often frustrating, laborious, contested process of creating what one participant called "a well-orchestrated ground truth" with all its limitations

Study 2

Design of Ground Truth Schemas for Medical AI - Who Decides What and How to Label On Medical Data?

In collaboration with Hubert Zając,
In this study we answer the research question "What factors influence the design of ground truth schemas for medical AI datasets and how". In this paper, we articulate the factors that crucially mediated the design process of the Ground Truth Schema towards the design of responsible AI, in our three studies. We ground our contributions in ethnographic findings from three projects that use AI in the medical domain: (I) screening chest x-rays, (II) AI-powered diagnostic tools for lung and pancreatic diseases (III) AI-powered platform for automatic patients-to-clinical trials matchmaking. We explore the negotiations, tensions, and compromises made by medical professionals, data scientists, and designers on their quest to create suitable medical AI datasets in highly constrained environments. The data includes approximately 50 hours of observations, 37 interviews, with medical professionals, data scientists and ML engineers, designers, as well as observation notes, email communication, reports, and artefacts. We followed the Grounded Theory recommendations to construct the five factors influencing the design of Ground Truth Schemas [Charmaz 2014].
Through this research, we first uncover the factors that affect the design decisions which further shape the medical AI datasets, even before their creation. We identify these factors, as internal to the labelling process and external ones.

Study 3[1]

From data care to data stewardship in the Healthcare Sector: Care-ful enactments and deviations

Over the last years, the increasing digitisation of healthcare services has transformed the provision of patient-centric care into data-centric healthcare (Gotz et al 2016; Zahid et al, 2021). Particularly, the employment of AI-powered systems for health service management and diagnostic decision-making in the public and private healthcare sector has mutated patient-centrism, as a human-centred care practice and value, to a data-centric one (Sunarti et al, 2021). Within this context, scholars have critically addressed issues emerging through this increasing datafication and automation of healthcare provision. One strand of critical research has shown how automation has asymmetrically affected the often invisible and devalued data work in the public health sector (Bossen, Pine et al 2019; Moller et al 2020). Scholars engaged with the notion of care from a Feminist STS perspective have problematised how these data-centric practices in caregiving signalled "technosolutionism" in the ways the care for health data is enacted (Kaziunas et al, 2017; Murphy, 2015). In this complex territory of the healthcare datafication and AI-fication, data stewardship, as this process of "taking care" of the appropriate and legally compliant provision, use and reuse of medical data, seems to acquire a renewed importance (Bukowski et al, 2019). Nevertheless, limited research has been conducted by Critical Data Scholars in order to conceptualise the role of data stewardship in this context.

In this paper, we investigate how data-centric care is enacted from the standpoints of data practitioners who are engaged in two different processes of data handling: **a.** The experts who are engaged with the "data creation" for the design of AI-powered systems for patients and clinical trials match-making, and AI-powered diagnostic tools, **b.** The data stewards who are responsible for the legally compliant provision, use and reuse of the medical data. To do so, we analyse the findings of multi-sited ethnographic research in two Northern European Health Tech Companies developing AI-powered systems and three hospitals in the UK and Greece. The objective of this paper is twofold. **Firstly,** we articulate the enactments of data-centric care by the experts in the particular context of our studies by looking at how the values of each domain of expertise inform the data care practices. **Secondly,** we show how data stewardship, as a matter of processual "care for compliance" is differentiated from the situated data care enactments and what conceptual implications this bears for the critical data studies.

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[1] This study has been partly conducted. The fieldwork in UK and Greece is planned to be conducted during Spring and Summer 2023.

Research Questions

RQ1: How is data produced in specific contexts and for specific purposes?
RQ2: Which are the processes that transform "quality data" into "valuable" data?

Research Objectives

1.Unpack the nitty-gritty processes of "data creation"/"data production" at the micro-level of domain expertise.
2. Articulate the dependencies and contestations of these practices.
3. Translate the implications of these practices to the ways that data value is perceived and traded at the mezzo level and macro level of the Industry and Policymakers.

Methodology

This PhD research project employs multi-sited ethnographic research as its core methods of choice. Ethnography has already been conducted in two Health Tech companies in order to gain a better understanding of how practitioners in the health tech industry think and practice health data. In total 26 experts were interviewed, with an average of 65 minutes in length, whilst we conducted follow-up interviews with two of the experts. Further ethnographic research is planned to be conducted in four public and private hospitals in UK, Denmark and Greece.

Short Bio

Natalia-Rozalia Avlona is a lawyer, researcher and Marie Curie PhD Fellow (DCODE) the Computer Science Department of the University of Copenhagen. Her research focuses on unworking data as a concept and practice in the Data-Driven Healthcare Sector.She studied law at the School of Law of the National and Kapodistrian University of Athens (2006), obtained her master's degree in Human Rights Law (LLM) from King's College London (2007), and followed courses in the department of Geography at Royal Holloway, University of London and in the department of Curating Contemporary Art at the Royal College of Art.

 Her expertise is on the intersection of open and emerging technologies with law and society, through a feminist framework. Furthermore, her wider interests have led her into working on the legal and ethical consequences of the emerging technologies.

Natalia has international experience working in several Organizations and European Research Programmes in UK, Belgium, Greece and Cyprus. Among those are the Future

Emerging Technologies Department (DG Connect, EU Commission), the Aristotle University of Thessaloniki, the Organisation of Industrial Property in Greece, the Royal College of Art in London, Abandon Normal Devices in Manchester, the University of Nicosia in Cyprus, the Heinrich Boell Stiftung in Greece, the General Secretariat for Gender Equality and the GUnet (Greek Universities Network) in Athens. Before joining the University of Copenhagen as Marie Curie Fellow, she was a Research Fellow at ELIAMEP (Hellenic Foundation for European & Foreign Policy) in Athens, where she led the AMIF ATHENA Research programme, and has worked as a Researcher on the Horizon2020 TARGET programme (Taking a Reflexive Approach to Gender Equality for Institutional Transformation) since 2019.

She is currently member of the Management Committee of the CA21118 Cost Action Platform Work Inclusion Living Lab (P-WILL) .She has also been smember of the Management Committee of the CA16121-From Sharing to Caring: Examining Socio-Technical Aspects of the Collaborative Economy (2017-2021). She is also the co-founder of the techno-feminist hacking network Restorative Infrastructures.

Besides her research path, Natalia has a strong involvement and commitment to feminist ethics as an activist in the field of commons, and Social and Solidarity Economy. She has run a series of workshops on Wikipedia for the Galleries, Libraries, Archives and Museums (GLAM) sector, co-organized feminist workshops on FOSS at hackerspace.gr (Django Girls Athens), Techno-feminist Festivals (/EtcAthens) and (un)conferences on the commons, and has given seminars on Gender & Open Technologies, Gender & Social and Solidarity Economy and co-organized workshops on Everyday Feminisms and Care for Degrowth Strategies. During the covid-19 pandemic, she has co-initiated the Emergency Making Aid, a local, bottom-up initiative of makers, architects, researchers that aimed at the making and donation of 3d -printed protective equipment to the medical personnel of the hospitals.

Statement for Feedback

It would be extremely useful to receive feedback on the following issues:
1. How to conceptualize these different studies within a stronger theoretical framework.
2. If the rest of the ethnographic fieldwork makes sense to be solely conducted in the public health care sector, or it should be comparatively done in the private versus the public hospitals.
3. How this research can be more organically situated in the CSCW community and scholarship.