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Co-Design as a Driver of Change

Introduction

Learning takes place everywhere, through our every action from the moment we are born until we die. Work is no exception. Understanding how work can be transformed through increased digitalization and how that, in turn, brings learning opportunities is an increasingly important topic (Vallo Hult et al. 2017; Vallo Hult et al. 2020; Vallo Hult, Islind, Norström et al. 2021; Vallo Hult et al. 2022). Work is not only being transformed by the automatization of existing tasks or by the replacement of routine work for enhanced work effectivity but also by creating completely new tasks, which in turn introduces new learning opportunities (Islind, Norström et al. 2021). Typically, any of those transformation types introduces learning opportunities that were not a part of that work setting before. Moreover, engagement in, and performance of, work activities that include new emergent task combinations has the potential to facilitate learning through sheer involvement in the change process of that particular activity (Billett 2020; Islind & Lundh Snis 2017; Lave 2008; McKenzie 2001). Such activities have the potential to facilitate learning; for instance, inclusion in digitalization efforts with the aim of digitalizing certain parts of work (Read et al. 2022).

Increased digitalization can encompass the design of novel digital artifacts, such as mobile applications (simply put, apps), to use within work settings to improve existing organizational performance (McKenzie 2001; Vallo Hult, Islind, & Norström 2021). The design of novel digital artifacts can also be embarked upon to enhance and increase the quality of certain processes (Sigurðardóttir et al., 2022). In healthcare, the focus is not primarily on organizational performance but on the quality of care, quality of data and on utilizing resources in appropriate ways at the right time; on performing efficiently (Islind, Johansson et al. 2021).

Prior work on the design, development and use of digital artifacts within healthcare settings has historically been focused to a large extent on electronic patient records and top-down implementation of large-scale information systems (Fitzpatrick & Ellingsen 2013). Due to the history of failed implementation in healthcare, healthcare professionals tend to be less enthusiastic about top-down implementation efforts and more prone towards involvement in smaller bottom-up design processes (Islind, Lindroth et al. 2019). That is where co-design comes in. Co-design is an empowering approach that focuses on including relevant

stakeholders iteratively throughout the design process (Islind & Lundh Snis 2018). It involves untrained stakeholders in design in all design activities (Islind, Lindroth et al. 2019; Sanders & Stappers 2008). Building on that notion, this paper takes its point of departure from two co-design processes, i.e., design processes where the end-users were heavily involved early on and iteratively throughout the process.

In this paper, the way these two longitudinal action research projects (each two and a half years in duration) contributed to transformational processes within healthcare practices is analyzed and discussed to yield novel insights on co-design as a driver of change. The empirical data that this paper rests on consists of observations, interviews, co-design sessions and workshops. The empirical data is used to probe the research question: What kind of change does co-design offer? The paper discusses co-design as a means of transforming practices as a foundation for conceptualizing deeper knowledge on how co-designing digital artifacts can trigger change. The paper focuses on the view of healthcare professionals and on the way their involvement in co-design facilitated changes in work through sheer participation. The main contribution of this paper is novel insights and conceptualization of co-design as a driver of change illustrated through three entangled processes of co-design transformation: i) increased digital competencies and digital awareness; ii) enabling tacit and invisible work tasks to become explicit, and; iii) cultivating reflections as an integrated part of work, even after the participation in the co-design process is completed.

Learning Through Participation

It no longer makes sense to distinguish between schools as a place for learning and other aspects of life as places for applying what has been learned (Fischer 2018; Willermark 2018). Work is not merely a place where knowledge is applied, instead, it is a place where new skills are developed, and existing skills are fundamentally transformed through increased integration of a variety of digital artifacts in complex digital ecosystems (Islind & Lundh Snis 2018; Vallo Hult, Islind, Norström et al. 2021). The need for continuous engagement of end-users in the design and development of digital artifacts to be used as integrated parts of work is thereby also increasing (Islind, Lindroth et al. 2019; Islind, Snis et al. 2019). To understand that notion, let us examine the concept of end-users. More specifically, there are several types of users: end-users are the primary users of the digital artifacts, the secondary users use the data derived from the end-users' interactions with the digital artifact, whilst tertiary users are third-order users that benefit from the digital artifacts and data flow within the digital ecosystem.

Regarding learning at work as a specific activity in addition to other work, or considering learning as something that is added on top of work, is simply not feasible. Instead, transformation and learning can be regarded as an ever-present element in all work (Argyris 1993; Brown & Duguid 2001; Engeström 2001; Wenger 1999). With that backdrop, there are different ways of learning at work. More specifically, learning encompasses formal, informal and incidental learning, considering organizational, social and technological aspects which influence how, when and why the learning takes place (Norström et al. 2017; Vallo Hult et al. 2017). Moreover, it has been argued that the most common mode of learning is participation in work-related activities (Billett 2014). Although Billett (2014) argues for participation as a focal point for learning at work, there is a gap in the literature regarding how participation should be facilitated.

Healthcare work offers an interesting case to consider. For instance, clinical work often includes a high degree of tacit knowledge, and probing change in clinical work needs to be carefully thought through. If the clinical practice is adequately supported, novel experiences can facilitate the expansion of new clinical capacities (Billett 2016). The support and scaffolding of the change is thereby of utmost importance.

A large part of work participation in clinical work comprises informal learning. Informal learning can include subtle, embedded and informal processes where knowledge is created, shared and exchanged within a practice, often supported by digital artifacts (Vallo Hult et al., 2022). Nevertheless, the perspective on learning varies in the literature and among practitioners, depending on whether knowledge is perceived as objectifiable, encoded and stored in knowledge databases or as embedded in and negotiated through human interactions (Brown & Duguid 2001).

Consequently, the learning conditions and challenges at work in general, and in clinical work in particular, call for redefining and analyzing the competencies and modes of transformation and learning that can be facilitated through change processes. This is vital to prepare practitioners for their adoption of and engagement in new technological advancements, i.e., learning through engagement during the design of digital artifacts. Fischer (2011) advocates for using digital artifacts to foster "cultures of participation" where members of the community get support from technological and social capital as well as from cognitive factors such as trust, altruism, empathy, connectedness and reciprocity among the social members of the different levels of participation. McKenzie (2001), in his seminal work, *Perform or Else,* identifies three types of performance in contemporary culture; organizational performance, technological performance and cultural performance. Furthermore, McKenzie (2001) discussed the social dimension of technology and how projected technologies are more social than technological. Introducing digital artifacts as facilitators for learning can, therefore, be argued as involving different types of performance (Islind, Norström et al. 2021; McKenzie 2001, 2005, 2019, 2022). This is well-aligned with a socio-technical view of design, a paradigm of viewing design as an activity that neither favours the humans nor the digital artifact but instead aims to embed important human elements into the design of digital artifacts (Islind & Hult 2022; Islind & Willermark 2022; Zoto et al. 2019). Therefore, it can be argued that social participation is important for the members of the community as a means to share knowledge that is neither a retractable objective nor an individual phenomenon (Alavi et al. 2005) but rather as something embedded in the interaction and connections of individuals, their setting and the digital artifacts which constantly effect their community (Thomas et al. 2001).

Co-design as a Driver of Change

Now, let us dig into the literature on design. Within research, there has been a long-standing focus on end-user participation and engagement in the design process (Bødker et al. 2000), whereas in industry, the detachment paradigm is sometimes considered the most effective way forward in costly processes of digital innovation (REF). The detachment paradigm favours efficiency in the design process over user participation, user experience and usability in the digital artifact (REF). However, how the design process is conducted can differ substantially when designing and developing digital artifacts to support work. On the one hand, the process can be conducted via detachment from the end-users (i.e.,

those designated as the users of the digital artifact) or, on the other hand, with the engagement of the end-users. Moreover, that particular engagement, and what engagement entails for who should participate—when, how and to what extent— can differ substantially (Islind, Lindroth et al. 2019; Sanders & Stappers 2008). The literature is paved with research on the benefits of end-user participation for the digital artifact itself, but there is a gap in the literature regarding what such participation can lead to for the end-users.

In co-design, the end-users and, to some extent, the secondary users are seen as a valuable resource in the design process. The co-design process is regarded as collaborative creativity where the end-users are engaged as co-designers (i.e., as collaborative agents or actors in the design process). Involving the end-users in design is not new—in participatory design, it has been the guiding philosophy for half a decennium. An important building block in the move towards participatory design was written by Cross (1972) in the preface to Design Participation, where the theme was "user participation in design":

> Professional designers in every field have failed in their assumed responsibility to predict and to design out the adverse effects of their projects. These harmful side effects can no longer be tolerated and regarded as inevitable if we are to survive the future […] There is certainly a need for new approaches to design if we are to arrest the escalating problems of the man-made world and citizen participation in decision making could possibly provide a necessary reorientation. (11)

When participatory design, and later collaborative design (which was ultimately termed co-design), emerged in the literature, this particular design philosophy was often targeted towards designing a specific service, one specific system or one type of digital technology. However, as the diversity of digital artifacts and technology in the world today increasingly grows, and small digital artifacts such as apps complement large digital infrastructures, we are not only designing products for, or with, end-users now; instead, we are designing complete future experiences and digital technology that construct cultures and new practices, which in turn has significant implications for what the previously mentioned work tasks look like. Overall, the co-design approach aims to actively involve relevant user groups in the design process to ensure that the results meet their respective needs (Islind & Lundh Snis 2018; Islind & Norström 2020). The fundaments of co-design as an approach thereby entails that the end-users have an integrated voice in the design processes that ultimately affect their lives (Joshi & Bratteteig 2016; Kensing & Greenbaum 2013). Co-design is thereby more specifically a collaborative creative activity where end-users, who are not trained in design, work alongside designers. These parties engage with each other to further the design process (Sanders & Stappers 2008), but as stated earlier, the focus on the benefits for the end-users is limited.

There are, however, some efforts in unpacking the benefits for the end-users. For instance, Malmborg et al. (2010) illustrate that a co-design approach in the care for older adults can unravel a number of context-related issues, such as issues related to identity and self-image, which have implications when selecting end-users as co-designers. Accordingly, in a successful co-design process where frail users are involved, it is vital that the participants can identify themselves as the future end-users of the digital artifact that is being designed (Islind & Norström 2020; Malmborg et al. 2010; Woll 2017). Facilitating the collaboration between older adults or cancer patients (hereinafter termed care recipients) and their

caregivers early on in the co-design process can be a basis for the future use situation and is an important building block of co-design. Consequently, design approaches, such as co-design, where genuine user participation is a key element in the design process, have to take diversified end-users needs into account in a co-design process in order to design a digital artifact that will be used successfully. But how the co-design process benefits the end-users is still unanswered by the literature. Tackling that research gap is essentially what this paper is about.

Research Approach

This paper is based on a qualitative research method called action research (AR), which is essentially a research method for studying how change unfolds. The core activity is to study complex social processes to the fullest (Avison et al. 1999; Baskerville 1999). AR goes beyond the notion that action can inform practice, recognizing that theory can be created through practice and emphasizes collaboration between practitioners and researchers (Avison et al. 1999; Baskerville 1999; Brydon-Miller et al. 2003; McKay & Marshall 2001). It is a democratic and participatory approach that aims to create practical and theoretical knowledge about change by bringing together action and reflection (Brydon-Miller et al. 2003; McKay & Marshall 2001; Reason & Bradbury 2001). As both the work situation and the digital artifact were co-designed with the caregivers and the care recipients in the cases I will discuss, action research as a participatory method enabled this melding of action and reflection.

The action research in both cases was conducted in three phases, even though the reflections of the problem perceptions and design activities occurred in an iterative cyclic process (Avison et al. 2001):

> (1) Initiation phase: meetings and workshops to set up the study and analyze the problem.
> (2) Intervention phase: design activities, interviews, workshops and home visits (in the case of home care) to discuss the development and the recurrent and continuous tests of the ever-evolving prototypes of the digital artifact.
> (3) Reflection phase: in-use activities, home visits and semi-structured interviews and additional testing to establish an understanding of the transformed practices.

The empirical data in both cases was primarily drawn from the design and intervention phase, where observations, co-design activities, workshops and semi-structured interviews were conducted to gather the data. The data in both cases combined consists of nearly forty separate co-design activities transcribed alongside numerous informal meetings and observation notes that were analyzed thematically for this paper.

In both cases, the goal was to co-design digital artifacts that could be run on a mobile device; in the case of home care, an app running on a tablet, and in the case of cancer rehabilitation, an app for smartphones. The co-design activities involved meeting the healthcare professionals (from this point on called caregivers) and care recipients and collaboratively co-designing the digital artifacts. The iterative design sessions and workshops meant meeting regularly with both caregivers and care recipients to shed light

on the daily routines of both parties whilst also testing, co-designing and assessing the evolving progress of the prototypes of the digital artifacts. Both co-design processes resulted in the design of digital artifacts (i.e., apps as working tools to be used within healthcare). Consequently, the apps were seen as tools for supporting care practices and understood as fully integrated with part of daily life and work, not something added on.

Results

The complexity of both co-design processes was high, and the end-users were heterogeneous. Both co-design processes had two main end-user groups: on the one hand, the caregivers and on the other hand, the care recipients. The first end-user group consisted of caregivers and included: i) auxiliary nurses in case one and; ii) specialized oncology nurses in case two. The end-user group of care recipients consisted of: i) older adults in case one and; ii) patients in case two. Even though the second end-user group has been highly important for the co-design processes, the unit of analysis in this paper is predominantly on the caregivers' involvement, the changes in their work practice, and their learning through participation in co-designing digital artifacts from scratch, tailored to fit their work practices. The co-design processes in both cases included iterations where the digital artifacts slowly grew over time. They grew from simple paper prototypes to full-scale mobile applications in both cases, and the empirical data herein is drawn from the iterations with the caregivers in both cases.

Change Through Co-design

Involvement in the co-design process was appreciated both by the care recipients as well as by the caregivers. As the older adults in the first case were frail older adults, and most of them could not complete the grocery shopping task in the mobile application themselves, the digital artifact had the secondary purpose of serving as a working tool for the caregivers. Still, the participation of older adults was vital since without their involvement and acceptance, the caregivers' work tool would not have been used. Interacting with each other early in the co-design process led to both end-user groups learning from each other and understanding the needs of the other end-user group. They learned technological things and what the digital technology could perform, what features were possible, as well as new routines in which they could utilize the digital artifact.

In the case of home care, a manager of the caregivers was present during a co-design session and expressed that the challenges of the aging society and designing tailored solutions for caregivers within home care and for older adults simultaneously was much needed: "The digital artifact is not just a feasible, neat technological solution to a problem. It is, for us, an entirely necessary solution to a vital problem." She was referring to the growing population of older adults in need of home care as well as the increasing workload with deteriorating resources per older adult: "It is important that we use hands where hands are needed within our home care [sector], intertwining digital solutions with the daily routine, so we are able to focus on just that; using hands where hands are needed."

Eventually, the decision was made that the tablet with the app would serve as a working tool for the caregivers, which would also entail changes in work tasks and routines. That necessitated educating the caregivers in using this new technology to their advantage. This formal educational part was short, leaving room for informal learning through engagement

and use of the digital artifact. By using the digital artifact, the caregivers no longer need to leave the older adult to go shopping. This increased the comfort of their work and at the same time freed up scheduled time for social presence with the older adults. The app, its interaction design, usability and user experience were carefully planned and tested iteratively in different phases due to the need for a comprehensive interaction to support their routine and ease daily workload.

Similarly, in the case of cancer rehabilitation, involvement in the co-design process had ripple effects. The co-design process in that case was chronologically done after the co-design process in the home care case and was similar in the way it was conducted. Each co-design session involved sketching or discussing the prototypes at hand. They involved a discussion on what type of functions in a digital artifact could support specific work tasks and how existing work tasks, alongside new ways of working, could be integrated and actualized through the digital artifact. The following excerpt is from a design workshop with two nurses. The conversation is about being involved in the design process that effects the way that they work.

> Nurse 1: This is truly good for one's way of working.
> Nurse 2: Yes, it's a way of spreading knowledge and because we do things so differently.
> Nurse 1: Knowledge transfer, we should have this kind of sessions more often.
> Nurse 2: Yes, mm. I take for granted that you do like I do.
> Nurse 1: That's true, and that's insane really when you think about it. We work differently. Or I think we work in a slightly different way.
> Nurse 1: When we do follow up, I think that's different at least.
> Nurse 2: It's really good to get a chance to sit down like this. I know other times when we have also sat down like this, it triggers exchange, and we get tips from each other. [Nurse 2 referring to other design sessions.]
> Nurse 1: Yes, it's really good. Even if we meet often, we don't get the chance to talk like this. This is healthcare development.
> Nurse 2: Mm. Yes. And learning.
> Nurse 1: Absolutely! We need more [design] workshops in healthcare.
> Nurse 1: Yes.

Focus on Work and Quality of Service

Through the co-design sessions, it became apparent in both cases that the caregivers had a clear focus on the quality of care and held the needs of the care recipients at heart. In the case of home care, it was about reclaiming dignity: "The older adults regain the control of their decision-making regarding choice of edibles as well as control over their payments. For the staff, it is the relief of not having to shop and being able to focus on care." In the case of cancer rehabilitation, nurses reflected on the care recipients learning about themselves and becoming increasingly equipped in self-care: "Over time, the patients can learn to use their own data to reflect on their progress, and they can also use that data in the conversation with us as well, and we have the same data, so we know exactly what they are referring to when they talk about a specific event."

From a care recipient perspective, when the co-design process was coming to an end, and the mobile application was becoming a part of daily practice, one older adult in the case of home care remarked: "I have been scared of technology before, but this is not so terrible. Even we, the old people, can use this, probably because it is partly designed by old people." The older adults were involved from the very beginning in the design process, and the effects on the caregivers' work, in turn, had effects on the way the older adults conveyed the service provided: "The use of the digital artifact leads to caregivers staying for a longer time with me and thus having time to talk to me." From the case of cancer rehabilitation, and using the digital artifact they had been a part of co-designing, a care recipient stated: "I definitely think it has helped. It's been good to see [the data]. Then I won't have to worry. It's so hard to remember. I have had headaches lately, then I checked the app and thought: 'mm, yes, yes, that is actually true. It's no wonder I've felt like this. I'm should probably take fluid supplements now. It has actually been bad,' I decided after that. I saw it there [in the data]. It had really been bad. Then I took fluid supplements." Reading the data and using it as a part of self-care processes while also being able to use it as a part of the healthcare conversation was realized through participation in the co-design process. If both end-user groups (the caregivers and the care recipients) had not been so involved in the co-design processes, then the caregivers would have had a harder time incorporating the digital artifact into their work, and the care recipients would have had issues incorporating the use of mobile applications in their everyday life.

Reflection in Action

Reflecting upon the transformation process and how their work had changed through the co-design process and how they incorporated the digital artifact into their work, a nurse commented: "This is about us changing the way we work and if I look at myself, I'm extremely comfortable [in my work]. I work in the way I have always done. And I don't even reflect upon the way I work, until someone questions it, someone asking about it, then I get some distance and start reflecting." Those types of reflections highlight the essence of co-design. It is not merely about designing digital artifacts but also about revealing new ways of working and triggering reflection about how things have always been done.

When discussing digitalizing parts of their work practice, which is a delicate process, a nurse remarked:

> It takes time and, hmm, and I have no time, that's what it will be like in the beginning. But when we have overcome the thresholds or when we see the potential upsides, then I think: "why was I so nervous about this?" This has been going quite well so far, and of course there are so many examples about that, when using new systems or documenting in a new way, but you still think: 'eh, I don't want to.' And then it goes great. And then think: "this wasn't so bad."

Even though the overall experience has been positive, it is a delicate process that needs to be done in collaboration. The changes when new types of technologies are incorporated into collaborations done slowly grounded in existing practice (like those between the caregivers and care recipients) can flourish, but they are not without challenges and often trigger different types of unforeseen changes. For instance, changes directed towards the

organizational practice in the case of home care included new work schedules and municipality-level decisions about who should pay for the tablets used by the caregivers. As one caregiver expressed it: "We cannot squeeze a digital artifact into the existing organization as it is today, it affects too many different levels of our organization, so organizational development is needed." For a co-design process to take that into account, it must include various conversations, some managerial levels where bypassing firewalls within a hospital are discussed, and others that are concrete design activities of improving a digital artifact.

Discussion

The dynamic work of today requires employees that can handle change (McKenzie 2001; Susskind & Susskind 2015). Because work more frequently relies on digital artifacts, and since resources are scarce, digital artifacts now more than ever need to be tailored to the task at hand. Because of that, the way they are designed is a vital aspect. The literature is paved with success stories of how much more effective, useful and user-friendly digital artifacts become with end-user involvement in the design process. But the question remains: what kind of change does co-design offer the participants? As argued earlier, when co-designing a digital artifact, the focus of the design process needs to be tailored to the requirements of the work practice, and what will now be argued is that it also needs to involve some gain for the participants themselves. The empirical data from these two cases of co-designing digital artifacts to support specific work tasks within care settings show the importance of the co-design process facilitating: i) increased digital competencies and digital awareness, ii) making tacit and invisible work tasks explicit, and; iii) cultivating reflection as an integrated part of work even after the co-design process is completed. These three processes of transformation through co-design, with co-design as the facilitator of change, are the main contribution of this paper.

In co-design, the goal is to involve relevant stakeholders, who will subsequently become the end-users of the digital artifact early on in the design process (Joshi 2017; Joshi & Bratteteig 2016; Sanders & Stappers 2008). However, in more complex situations, where the end-users consist of more than one stakeholder group, the core of the co-design effort involves bridging the prevailing boundaries. The source of boundaries in co-design is rooted in the interface and dynamics among use practices, design practices, and work practices (Islind 2018). Boundaries come from different backgrounds and diverse communication methods (Akkerman & Bakker 2011; Wenger 1999). More specifically, in a co-design situation, pre-existing boundaries are embedded in differences related to competence, professions, values, interests, age, social status, or power (Sanders & Stappers 2008). Co-design as an approach, therefore, rests on a combination of the designer's expertise and the situated expertise of the different end-user groups whose situations will be impacted by the intended change. Since the benefits of the digital artifacts and boundary crossing are settled, the issue of what kind of change co-design involvement offers the participants needs to be further unpacked.

The end-user groups impacted by the intended change herein are the caregivers and the care recipients. The caregivers consist of auxiliary and specialized nurses. They belong to care sectors that are paved with examples of failed implementations due to usability issues or superficial understanding of the practices involved (Ellingsen & Monteiro 2012; Fitzgerald & Russo 2005; Monteiro et al. 2013), leaving us with a healthcare sector that, in

some cases, can be sceptical towards digitalization efforts. Even though there was scepticism at the beginning of both co-design processes, the iterations and meeting again and again, building trust over time, bridging pre-existing boundaries and slowly getting both end-user groups on the same page made these two co-design processes work. Working towards a common goal was an important part.

This paper's results show parallel processes of creating new types of digital resources to be applied within a healthcare sector marked by deteriorating resources. The two co-design processes herein showed how learning was facilitated through the process of the caregivers discussing their work explicitly. Moreover, it outlines invisible work and enables it to become visible (Islind, Vallo Hult et al. 2021). By making the tacit and invisible work tasks explicit and discussing specific aspects of the practice itself by allowing for reflections, the work was transformed. Consequently, the benefits for participants in the co-design processes were high on both individual and practice levels.

Regarding learning as an ever-present element in all work (cf. Argyris 1993; Brown & Duguid 2001; Wenger 1999) then engaging in transformation processes facilitates the potential for learning through that particular activity (Lave, 2008)—in this paper through the activity of co-design. Transformation processes can bring novel experiences (Billett 2016) and trigger the potential for learning new things that might not have been learned otherwise through routine work, which can also be seen from these co-design processes. It is essential to have strategies to capture this type of transformation of learning outcomes. Through the analysis of two cases, this paper identifies three parallel transformation processes, which give synergic effects into care capacities that can lower the threshold for initiating and partaking in a co-design process and, in turn, increases acceptance of the digital artifact.

Increased Digital competencies and Digital Awareness Through Co-design

The first transformation process is transformation focusing on the design work. This transformation process is a learning process focused on developing new competencies needed for design work. Such competencies can, for instance, include using prototypes as a means to conceptualize interaction design and being able to reflect upon these prototypes together. The designers and both end-user groups worked together and shared knowledge which increased their digital competencies as well as their ability to conceptualize digital artifacts by using prototypes. Transformation through design work considers competencies derived from working with specific design methods while also learning how to navigate and actively contribute to a design process using such methods. Examples of methods are, for instance, to illustrate the end-users needs in terms of personas, to engage actively in mapping user journeys, and an understanding of the way different types of choices would affect the user experience of the digital artifacts. Transformation through design also includes learning which technological features are possible and reasonable to implement in the digital artifacts and which are not. Working as an auxiliary nurse or a specialized oncology nurse does not usually require much digital competence because many aspects of these work practices still constitute analogue work routines. Consequently, the transformation through the design aspect was an important learning process in both cases, furthering the digital competencies within both practices. Increased digital competencies through design facilitated learning how to use design methods while also gaining more insight into which parts of their practices were reasonable to digitalize and which were

not. What can be derived from this is thereby increased digital competency and digital awareness through involvement in the co-design processes.

Making Work Tasks Explicit and Learning Through Reflection in Co-design

The second transformation process includes transformation through participation, making work tasks explicit, and creating room for reflection, which encompasses the process of making the implicit and tacit explicit. This transformation process included scrutinizing and reflecting upon everyday work and how work tasks were performed. In both cases presented in this paper, the reflection facilitated change in how work was performed. The importance of making the work explicit, and the learning process facilitated and negotiated through the discussion between the various caregivers in collaboration with the care recipients, was, in both cases, an unexpected learning process and in the periphery of the transformation through design which was expected to take place. However, as it was realized through the first co-design process in the case of home care, it was anticipated in the second co-design process. The second co-design process included co-design sessions specifically targeted towards understanding the consultation, which is an important part of the work of a nurse. Those co-design sessions were, therefore, not included for prototyping purposes but as an important boundary-crossing activity. Through participation, the practitioners reflected upon their way of working and started looking inwards. Consequently, this transformation process encompassed informal and incidental learning through co-design (Islind & Lundh Snis 2017). The rather formal design process facilitated an informal reflection on the practitioners' way of conducting their work and the care recipients' way of conducting self-care. This element was novel and facilitated an expansion of new professional capacities (Billett 2016). These capacities in the case of home care were, for instance, the realization of not being able to squeeze the digital artifact into the existing organization and the openness to the organizational transformation. In the case of cancer rehabilitation, the new capacities were, for instance, having more insights into each other's different ways of conducting work as well as reflecting upon being comfortable with the way work was performed and realizing that the change process following the design process, which may at first have seemed frightening, turned out well. It is essential to have strategies to capture this type of transformation in terms of learning outcomes. While the design methods utilized in these cases facilitated practice learning in terms of transformation through participation, there is a need to plan for and to make time for reflection on work and on making work tasks explicit during the co-design process. Co-design processes that capture and facilitate both informal and formal learning through these types of reflections have the potential to lead to the transformation of practices through participation.

Cultivating Reflection as an Integrated Part of Work

The three transformation processes where the participants gained benefit can be conceptualized through three modes of co-design transformation and change: i) increased digital competencies and digital awareness, ii) making tacit work tasks explicit, and; iii) cultivating the notion of making room for reflection as an integrated part of work, even after the co-design process is completed. These three modes of co-design transformation and change were entangled in the design sessions, and it is merely for analytical purposes that these transformation processes, or modes of co-design change, have been separated. Cultivating the notion of making room for reflection as an integrated part of everyday work,

and decreasing the focus on performativity at work, are also important factors gained from the co-design participation.

The transformation processes that are triggered through participation in co-design have individual as well as practice-related implications, meaning that transformation through co-design both benefitted the individual auxiliary nurse while also benefitting the home care practice. The same goes for the cancer rehabilitation case, where transformation through design increased the digital competency of the individual nurse while also contributing to the digitalization of the clinical practice. The transformation through participation also has individual aspects regarding the heterogeneity in the way practitioners work as individuals in terms of realizing that they can, to a larger extent, learn from each other while also facilitating learning for the practice as a whole by reflecting together as a community to forward the change process as a practice.

Conclusion

Design and transformation play a vital role in healthcare and welfare today. Due to increased digitalization efforts where healthcare has been historically lacking behind, it is important to understand what kind of changes participation in co-design offers to those engaged in such efforts. Unpacking that particular issue has been the main focus of this paper. The two cases both illustrate significant change through co-design in care practices. In this paper, participation was analyzed, and how the division of labour between humans and digital artifacts was negotiated as part of the co-design processes was an important element. The main contribution of this paper is illustrated in co-design as a driver for change through a conceptualization of three modes of co-design transformation: i) increased digital competencies and digital awareness, ii) making tacit work tasks explicit, and; iii) cultivating the notion of making room for reflection as an integrated part of work, even after the co-design process is completed. While the digitalization of care practices is necessary to cope with the increasing numbers of care recipients and increasingly scarce resources in care, it also turned out to have an entangled transformational effect on the practices involved. Participating in co-design processes thus both benefits the digital artifact that is being designed while also significantly benefitting those that participate in the co-design effort.

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