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The Digital Work Environment–a Challenge and an Opportunity for CSCW

Gerolf Nauwerck
The Health, Technology and Organisations research group, Department of Information Technology, Uppsala University, Sweden.
gerolf.nauwerck@it.uu.se

Rebecka Cowen Forssell
Centre for Work Life Studies and Evaluation (CTA), Department of Urban Studies, Malmö University, Sweden.
rebecka.forssell@mau.se

Abstract. In this exploratory paper we will present the emerging concept of the Digital Work Environment. This is concept rooted in Swedish debate on the workplace, information and communication technology (ICT) and well-being. We argue that the concept can be understood as a boundary object uniting different actors (mainly researchers, unions, and policy makers) in a common discourse on what has been labelled as the dark side of information technology. We also argue that the concept needs to embrace an organisational perspective as well as the relational aspects of the psychosocial work environment. Such a move would open the door to a large volume of relevant research that might reinvigorate the concept. More specifically we will show how this would allow the inclusion of the increasingly important aspect of cyberbullying, which at the same time is an example of blurring borders between work and non-work ICT use.

Introduction

Walsham (2012) has been making the case for a more critical and socially oriented approach to research on information and communication technology (ICT), asking the question: "are we making a better world with ICT?" (Ibid. p. 91). Given the worldwide rise of workplace burnout (Carod-Artal & Vázquez-Cabrera, 2013) the workplace remains a relevant setting for researchers wishing to make a better world. Over the last decades enterprise ICT has become increasingly complex, as new generations of solutions are layered over the old ones. We still rely on ERP systems and legacy systems based on database technology (Armstrong et al. 2012, Bergin & Haigh, 2009), big data is all the rage (Walker, 2015) as is gamification (Robson et al., 2015), the Internet of Things (Lee & Lee, 2015), machine learning (Jordan & Mitchell, 2015) and so on. What

awaits around the corner we can only speculate in (cf. Neely, 2013). However, all this complexity not only brings benefits to organisations and employees, there are challenges too. Tarafdar et al. (2013) refer to this as the dark side of ICT. Writing on information and attention, van Knippenberg et al. (2015) summarizes the challenges on various levels:

> With these new opportunities for creating and capturing value, though, come pathologies for individuals, teams, and the organizations themselves. [—-] The pathologies that can result from such challenges run the gamut from exhaustion and burnout to impaired judgment, suboptimal decision making, wasted effort, and reduced productivity. (Ibid. p. 650)

The field of computer supported collaborative work (CSCW) has a long tradition of studying the relation between work and ICT. Regardless of whether CSCW in understood the strict sense (Schmidt, 2001) or in a wider sense (Blomberg and Karasti, 2013), it will have an impact on the Digital Work Environment. Hence, being aware of this impact should be relevant to the study of CSCW. Furthermore, as there is comparatively little research on the dark side of ICT (Tarafdar, 2013) CSCW researchers should also be able contribute towards filling a research gap in this highly important research area.

In this exploratory paper we reflect upon the concept of the *Digital Work Environment*, a concept strongly rooted in the traditions of the welfare state in Scandinavia in general and in Sweden in particular. As such, it might be hard to understand outside of this context. We will however argue that the concept has been successful in raising public awareness in Sweden on the dark side of ICT. At the same time we note that the current understanding of the concept is based on cognitivist thinking and a limited understanding of the social embeddedness of software. By introducing the example of cyberbullying we wish to point out that what constitutes the Digital Work Environment is constantly changing. So far, cyberbullying has received little attention in the discussion on Digital Work Environment. Still we will argue, that with the emergence of cyberbullying in working life new situations occur that forces us to widen the understanding of the Digital Work Environment.

The rest of the paper is structured as follows. First we take a closer look at the concept of the Digital Work Environment, its genesis, strengths and limitations. We then present cyberbullying as an example of a relevant problem that needs to be included in the discourse on the Digital Work Environment. We end with suggesting that the strength of the concept lies in its functioning as a boundary object and challenge the CSCW community to engage in the discourse.

The Digital Work Environment

We wish to point the CSCW community to the relative success of the emergent concept *Digital Work Environment* in Swedish public debate. The concept Digital Work Environment dates back at least to the year 2000, but it was with the release

of a polemic book by usability expert Jonas Söderström (2010) that the concept became part of mainstream debate. The book argues that much of workplace ICT –as a result of bad design and implementation–does not support the user, rather it often contributes to stress. Today the concept is used in Swedish media, in Swedish government reports, by Swedish unions and even in campaigns by Swedish telecom companies. A quick search for the term in the Retriever Research database (January 2018) yielded 351 hits from various Swedish news sources. The increasing popularity was also obvious, with 80% articles being published over the last four years (2014-2017).

The concept has it roots in the term *work environment*, which in turn is related to occupational health and safety. Thus, when the concept Digital Work Environment emerged in the Swedish public debate it was as a rhetorical figure alluding to established concepts such as the psychosocial work environment or the physiological work environment. (For an overview of the concept, see Abrahamsson & Johansson, 2013.) More specifically it is related to the term *cognitive* work environment (Lind et al., 1991). This concept is part of a longer research tradition including classic works such as *User centered system design* by Norman & Draper (1986) and *Cognitive Work Analysis* by Vincente (1999).

Related concepts such as technostress focuses on pathologies at the individual level, while causes remain a complex of antecedents. Thus, technostress denotes an individual problem. In contrast, the Digital Work Environment moves focus from the individual to the antecedents, in turn indicating that these can be addressed. Even the antecedents can however be understood as contextual or social, rather than just related to a single system. An example of this is the concept of technological gaps (Bailey et al., 2010). Technological gaps relates to technology interdependence. This can be understood as a specific aspect of coordination and (task) interdependence within organisations, where the technology itself brings certain constraints as well as strategies for closing the gaps.

There is no consensus on the definition of the concept. On the contrary, there is a continuum, ranging from what could be understood as a strong definition to an all encompassing, weak definition. The strong definition focuses on interface design and cognitive aspects, whereas the weak definition seeks to cover most aspects of the modern workplace:

> The work environment, with its problems and opportunities of physical, organizational, social and cognitive nature, which results from the digitization of work support systems and tools. (Gulliksen et al., in press)

It should also be noted that the concept up until now has not been used in a strict academic context and in the debate it is sometimes also avoided for the very same reason. Instead, the concept has been replaced with constructs such as “the impact of digitalisation on the work environment”. We will not comment further on the above definition here, instead we will focus on some limitations that are not the

result of the concept as such but rather the research tradition from which it originated.

Limitations to the Current Approach to the Digital Work Environment

Some researchers have claimed that research on the Digital Work Environment is limited (Gulliksen et al., 2015). This is however a rather strong claim. On the contrary, there can be no doubt that many of the issues related to the concept have been at the centre of research for quite a long time. Indeed, a large number of issues are identified as well as analysed and theorized in Zuboff's 1988 classic In the Age of the Smart Machine. Taking a few cues from Foucault, her idea of automating/informating remains a very powerful tool for analysis of the digital transformation and its effect on the Digital Work Environment.

We argue that this perceived research gap is the result of the research traditions in human computer interaction and ergonomics, where the concept is perhaps most frequently used. Taking a broader view will reveal much relevant research; this in turn may open up a whole new palette of concepts and frameworks that can be used to revitalize the research related to the Digital Work Environment. By this we do not mean that current research should be abandoned, rather that the field is too important to be dominated by just one tradition.

The following case can serve as an example of the difficulties that might arise from approaching software (in the workplace) in the same manner as hardware (in the laboratory).

One of the better-known stories relating to ICT and the work environment is the establishment of the TCO Certification of IT products (TCO Certified), based on life cycle criteria for social and environmental responsibility. This was the result of collaborations between researchers and unions and quickly went from a Swedish example to a global certification. As researchers continued to study the effects of ICT in the workplace it seemed like a good idea to replicate the success of the TCO Certification of hardware with a similar certification of software. Thus, the UsersAward project was initiated (Walldius et al., 2009). There were some significant differences in approach, one important one being that while the hardware certification was based on expert analysis, the UsersAward was to be based on users experiences of software in use (in line with both the ISO standard of usability and research). While the project resulted in some software certifications, the project did not experience anything similar to the success of the TCO Certification. It has been argued that this can be related to different methodologies for assessment:

> In the end it was no economic viability in combining TCO Certified with USER Certified. The former being an expert based certification of hardware related to environmentally and socially

> sustainable production, use and recycling and the latter a user based certification of software quality (Walldius et al., 2016, p. 138, our translation.)

Rather than attributing the difficulties to methodological issues, we put forward that it perhaps more related to the discrete nature of hardware versus the continuous nature of software. This is a similar argument to that raised by authors such as Ensmenger (2012) and Mahoney (2008) when discussing software history. Ensmenger stresses the differences in the following way:

> Whereas the computer itself was a definite material artifact that could readily be identified and isolated for testing, evaluation, and improvement, software systems were inextricably intertwined with a larger system of computing that included not just machines, but also people and processes. (Ibid. p. 762)

In short, hardware lends itself to certification quite easily, but software–especially enterprise software–does not. The reason for this being its embeddedness in a complex social setting, in Mahoney's words:

> Thus, the models and tools that constitute software reflect the histories of the communities that created them and cannot be understood without knowledge of those histories, which extend beyond computers and computing to encompass the full range of human activities. All software, even the most current, is in that sense "legacy" software. (Mahoney, 2008, p. 8)

Of course, we are not arguing that the researchers behind UsersAwards are not aware of this, on the contrary this is part of why they wished the certification to be based on users opinions. Still, there seems to be an underlying idea that both hardware and software are discrete artefacts. Another way of putting this would be to say that the material turn is being underway but not completed (cf. D'Adderio, 2010).

This, we believe, can in part be attributed to the genesis of the concept of the Digital Work Environment. This can be traced back to a concern for workers safety and health in the 1970s, which relied strongly on the field of ergonomics and human factors. This wide, interdisciplinary field has been described as having three focus areas (in order of importance): physical ergonomics, cognitive ergonomics and organisational ergonomics. (To make distinctions even less clear, Swedish legislation introduces the overlapping concepts of the physical and the organisational and social work environment.) Basic questions relating to the Digital Work Environment are still based on physical ergonomics, such as posture and mouse movements. Most (traditional) usability issues fall under cognitive ergonomics. The subfield of organisational ergonomics is in comparison fairly immature, yet it is–presumably–here that we would find an understanding of the more complex interplay between software and organisation including such phenomena as cyberbullying.

Software can be understood as being co-created in actual use, but in earlier decades there were still limited instances of software in a particular workplace and hence the effects were also more limited. This has radically changed now, with what can be summarized as a proliferation of ubiquitous computing. Thus,

the need to understand the social embeddedness is more critical today and this is why we believe that the concept of the Digital Work Environment needs to be updated with insights from research on contemporary working life.

Cyberbullying as an Emerging Issue in the Digital Work Environment

One relatively new issue in the concept of Digital Work Environment is the emerging phenomenon of cyberbullying in working life. Broadly defined, cyberbullying refers to deviant and hostile behaviour that involves the use of email, text messages, blogs and social network sites e.g. Facebook, or other information communication technologies (Kowalski, Limber, Agatston, 2012; Patchin & Hinduja, 2006). In line with most definitions of workplace bullying, cyberbullying creates situations where the target feels helpless and defenceless from the negative acts (Vranjes, Baillien, Vandebosch, Erreygers, & De Witte, 2017). Being a new phenomenon, cyberbullying in working life is so far an under-researched area (Bartlett, 2011; Göransson, 2011; Privitera, 2009; Brack, 2014). However, there is an increased volume of studies on cyberbullying in working life that show negative implications related to the targeted individual's health and job satisfaction (Coyne, 2016; D'cruz, 2013; Muhonen et al., 2017; Snyman, 2015). While research on cyberbullying in working life is still in its infancy, the youth literature provides complemented insight into how cyberbullying can be expressed. Kowalski et al. (2012) outlines a number of behaviours that they argue constitutes cyberbullying, such as; flaming (e.g. brief, heated exchange between two or more people, often on public online forum), cyber harassment (e.g. repetitive and persistent negative behaviour online directed to a specific target), denigration (e.g. spreading of false or cruel statements about another person online), ostracism (e.g. social exclusion of another person on password-protected online forums) and cyberstalking (e.g. the use of electronic communication to stalk another person).

Cyberbullying can be understood as the result of increased communication based on digital media. Email is the most commonly used communication technology in working life and two of three Swedish employees use email on a daily basis (Findahl, 2012). Enhanced by mobile devices such as smartphones and laptops, communication in working life has become increasingly less time and spatial bounded. Communication technology enables people to work and communicate from other places than the workplace and at other times than during work hours. As a consequence, previously separated boundaries between work and non-work have become extensively blurred. Compared to traditional workplace bullying, cyberbullying can continue or even begin when the working day is over. Thus, cyberbullying challenges previous understandings of *when* the bullying is work related. For managers who are obliged to act upon and prevent

bullying in the workplace, understanding the distinction between what is work and private related conflicts become crucial. Moreover, the accessibility in digital communication also means that new types of actors, not necessarily members of their own organisation, but clients, customers, students or pupils can with more ease than before target an employee. Thus, the communication technologies used in cyberbullying challenges traditional understandings of *who* are perpetrators in work life bullying. Understanding what type of relations are present in situations of bullying also has consequences for how these situations can be dealt with within a work organisation.

While most digital communication in working life is conducted via email, social network sites such as Facebook are becoming increasingly commonplace in work organisations. In the literature on organisational ICT, the use of social network sites is often divided into two main types of use. The use of public social networking sites for communication with external parties such as customers, vendors and the public at large, and the use of internal social networking sites owned by the organisation for internal communication only (Leonardi, Huysman, & Steinfield, 2013; Rooksby et al., 2009). Although social network sites have a widespread use for organisations, most social network sites are primarily used by individuals for private purposes. Nevertheless, when users are including connections from different spheres of their lives, including professional contacts, social network sites such as Facebook also become a platform for work relations (cf. Marwick, 2011; Vitak, Lampe, Gray, & Ellison, 2012). The use of private social network sites as platforms for the maintenance of work relationships further contributes to the perception of blurred boundaries between work and non-work, as well as the private and the professional.

Cyberbullying is an example of the complexity involved in the concept of Digital Work Environment. As cyberbullying cannot be limited to the physical workplace or to the relations associated within the workplace, the phenomenon of cyberbullying stresses how Digital Work Environment extends to involve places, situations and relations outside the physical workplace. Moreover, as cyberbullying in working life involve the use of private social network sites such as Facebook, we argue that cyberbullying challenges traditional understandings of what constitutes the workplace IT. On the one hand, social network sites are increasingly used within organisations as a tool for information dissemination, recruiting and promotion of the work organization (Vitak et al., 2012). Thus, social network sites can be understood as 'Shadow IT' of an organization i.e. as an unsanctioned supplement to the work organisation's IT portfolio (Rentrop & Zimmermann, 2012). On the other hand, a social network sites such as Facebook is primarily a platform for social interactions. As interaction on such sites not only includes co-workers but most often also family members and friends, employers' interferences may be a sensitive issue that generates concern regarding workers privacy and integrity.

The Digital Work Environment as a Boundary Object

There might seem to be a paradox here. On the one hand, we have argued that some of the shortcomings of previous efforts to address issues in the Digital Work Environment can be traced back to a conflation of hardware and software. On the other hand, we have also argued that in spite of these shortcomings the concept of the Digital Work Environment has proved successful in the context of public policy and debate. So, the question is how can the same concept be subject to a critique while at the same time seem so successful in public debate?

In reply to this we would like to draw on Star (2010) and her idea of boundary objects (for a discussion see Lee, 2007). In fact, we would like to suggest that the concept of the Digital Work Environment functions similar to a boundary object. Star argues that a boundary object allows "different groups to work together without consensus" (Star, 2010, p. 602), one important aspect of this being the boundary object's interpretative flexibility. The term has been used to discuss theoretical concepts such as resilience (Brand & Jax, 2007). This is in line with Star's own reasoning as she points out that a boundary object derives its materiality from being acted toward and with, not the other way around. Some researchers have also combined boundary objects in combination with communities of practice.

All in all, this provides a framework for understanding the concept of the Digital Work Environment. The loosely defined concept has interpretative flexibility and seems to allow researchers, unions and policy makers and even practitioners to engage in a common discourse over professional borders. We illustrate our argument with Figure 1, below.

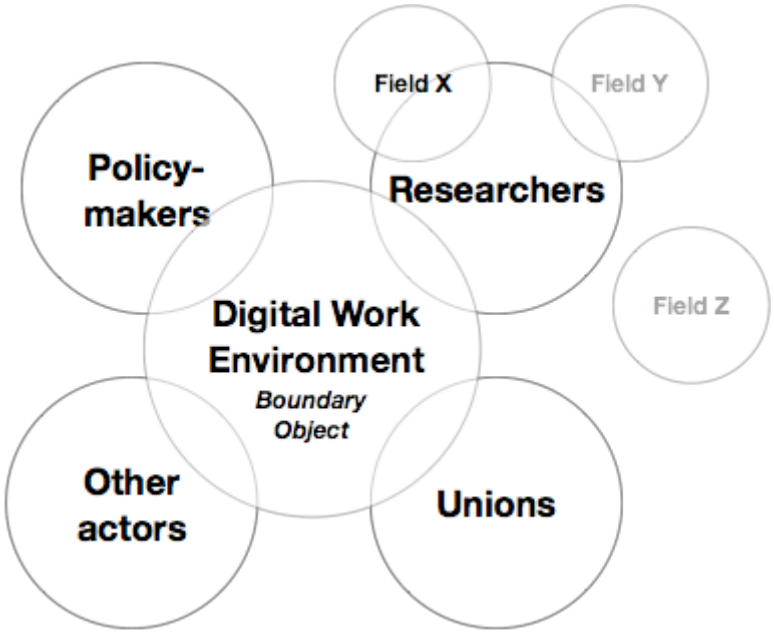

Figure 1. The Digital Work Environment as a boundary object.

The concept of the Digital Work Environment is here suggested to function as a boundary object. At the same time the research discourse has been dominated by the cognitive research tradition, and we argue that other research fields needs to engage in the same discourse.

It can also be argued that there is a need for flexibility and interpretation in the concept in a time where technological advancements emerge with a rapid speed (Rosa, 2014). Thus, what constitutes the Digital Work Environment is constantly negotiated and developed. Moreover, in order to explore the concept we must also pay notice to what constitutes the organisation's work environment. New behaviours and patterns emerging from communication technologies can be argued to challenge traditional understandings of the organisation's work environment and the workplace IT.

Discussion

To move forward, it is now necessary to build more strongly upon insights and research from the field of organisations and ICT. So far, the phenomenon of cyberbullying has received little attention in the discussion on the Digital Work Environment. Yet, the emergence of cyberbullying creates new situations that need to be handled on an individual as well as on an organisational level. Essential to this transformation of working life conditions and practices, we believe, are the introduction of digital platforms such as social network sites that tends to blur boundaries between the private and the professional. Thus, characteristic for cyberbullying is that the bullying behaviour cannot be restricted to the physical workplace or to the relationships within the workplace. Moreover, new platforms for work life interaction are constantly emerging. In other words, the example of cyberbullying in working life points to the limits of a cognitive approach to the analysis of the digital work environment. Thus, while cognitive aspects remain important it is also necessary to include organisational and relational aspect of the work environment. Finally it is also important to include technologies not traditionally associated with workplace ICT in the analysis, such as social networking.

The need for a wider approach is even more important as organisations themselves are changing rapidly, and we need to account for emerging forms, such as post-bureaucratic organisations (Kellog et al., 2006)–and phenomena such as the "gig economy" (de Stefano, 2016). An important part of this understanding comes, we would argue, from letting go of the idea of software as discrete artefacts and embracing the complexity that comes with an understanding of software as something inherently integrated in the practices of an organisation. An argument more eloquently stated by Orlikowski & Yates (2016):

> We believe that such approaches are particularly valuable as they afford the possibility of accounting for the messy, dynamic, contested, contingent, negotiated, improvised, heterogeneous, and multilevel character of ICTs in organizations. (Ibid. p. 132)

One important aspect of this is that if we wish to reduce the pathologies, the managers' attention is necessary. Indeed, creating organizational resilience relating to the Digital Work Environment can be understood as a capacity building process, working from the microfoundations and up (Eggers & Kaplan, 2013). Of course, taking this step also opens up to a complexity where there are no clear cut answers and different approaches emphasise different aspects, as shown in an overview of various strands of social constructivism, by Leonardi and Barley (2010). Nevertheless, as argued by Volkoff & Strong (2013) in relation to critical realism, there is value for practitioners as well as researchers in these approaches: to ensure that an organization achieves useful outcomes from IT" (Ibid. p. 832)–or in other words a good Digital Work Environment.

This call for a wider approach is in itself nothing new, in many ways it mirrors the argument in Bannon (1995) and the call to shift focus from human factors to human actors. Still, it seems evident that this call might need to be repeated. However, as the field of CSCW has embraced the practice approach (Kuutti & Bannon, 2014), we believe it is well positioned to develop our understanding of the Digital Work Environment. Furthermore, Wolf et al. (2015) claim that progress in the field of CSCW has "not been accompanied by wholesale acceptance in the commercial and industrial world" (Ibid. p. 2). Framing research as related to the Digital Work Environment should possibly make it more relevant to a larger community outside of academia, as made evident by the Swedish example.

Conclusions

In this paper we have discussed the emergent concept of the Digital Work Environment. We have argued that this concept has been successful in the Swedish policy debate, shining a light on the dark side of information technology. We claim that this is in part because the concept works as a boundary object. At the same time we stress that the concept is still strongly rooted in a cognitive tradition. Cognitive ergonomics are necessary but not sufficient approach to understand new challenges to the digital workplace such issues as cyberbullying.

Clearly, more analytical development is needed but we believe that the CSCW community is well positioned to contribute to research on the Digital Work Environment. Furthermore, finding a similar term would not only be a bridge between researchers but also between researchers and the public. Thus we end with a challenge to the community to find a suitable term–or to embrace the Digital Work Environment.

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