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From 'Virtuality' to Practice: Researching the Intranet as a 'Socio-material Assemblage'

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This article aims to defend a practice-based understanding of software applications in general, and of intranets in particular. Recently, the notion of practice has become prominent, not only in the area of Science and Technology Studies (STS), but in social theory in general. It rests on the understanding that the social has to be analysed as an ongoing accomplishment which transpires through situated, local activities. Artefacts are conceptualised as part and bearer of these activities and refer to the socio-material dimension of practices. This article, therefore, presents the relevant literature on the utility of practice theory for software research. Furthermore, it outlines methodological implications that stem from the conception of practices by introducing the idea of a 'praxiography'. This discussion takes place in the context of an ongoing investigation of collaboration software which explores a company's intranet in different departments in which it interacts with a variety of work practices. Overall, the article will present the practice theoretic perspective as an appropriate research stance for social scientific research of software applications. It concludes by looking at the challenges practice-based research has to tackle.

Keywords: practice theory, socio-materiality, praxiography, assemblage, organisation studies, intranet software, software studies.

Introduction

As the Internet has grown, theories about it have accumulated, treating it as a utopian realm of simulation with yet unknown possibilities (Turkle 1995, see also Bühl 1996). The emergence of numerous websites and their software applications caused an enthusiastic engagement with the World Wide Web (Luke 1999). Notions such as *virtual reality* and *cyberspace* dominate the literature and the understanding of the Internet and the computer in the 1990s. For example, Howard Rheingold's book *Virtual Reality* (1992) displays this enthusiasm when he describes his experiences with the Internet and the changes he anticipates. He explains, 'it might be the gateway to the Matrix. Let us hope it will be a new laboratory of the spirit – and let's see what we can do to steer it that way.' (Rheingold

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1992, 391). This statement exposes the excitement towards the Internet that was predominant during this time. Moreover, Manuel Castells' description of the 'Network Society' (2000) similarly presents an understanding of events happening on the screen as totally disembodied from so-called 'offline' life. However, this characterisation led to an understanding of the Internet and related software applications as a virtual realm, ascribing the computer a hidden agenda operating behind the screen and making various effects and events possible.

In this article, I will critically discuss understandings of the computer and software. I critique a notion of the 'virtual' which is seen as a separate realm, detached from people's day to day activities. Instead, I propose a practice-based understanding that considers software as being very much *attached* to people's lives, while shaping and influencing their activities. I proceed by first of all referring to ethnographic research on software usages where the material dimension of software is emphasised. However, ethnographic research mostly lacks an explicit account on practices, which is why I provide an insight into key conceptualisations within practice theory, especially in relation to research on technologies in organisations. As I aim to work out the methodological implications stemming from a practice-based research approach, I will introduce the idea of a 'praxiography' (Mol 2002), a strategy for ethnographic research on socio-material practices. As I will show, the praxiographic inquiry is relevant for an investigation into software applications since it follows the practices that first of all bring about the software as a specific artefact. The vocabulary for this undertaking is presented in relation to my (ongoing) research on intranet software in a company working in the telecommunication industry. Since I have just begun data gathering, the proposed approach stays, in some parts, preliminary. I end with outlining challenges for practice-based research.

Resting upon concepts in Science and Technology Studies (STS) as well as research on software applications, particularly intranets, my project contributes to recent literature based on insights and understandings developed within science studies utilised for organisational and management research (cf. Orlikowski 2007, see also Harris 2005). In addition, it aims to add, within organisation studies, to a growing attention on actual work practices instead of giving priority to theoretical conceptions (Nicolini 2009, 1391). Even though the praxiographic research perspective I propose here is not genuinely new, the way it brings together different sub-disciplines in the social sciences, such as media research, organisations studies and STS, functions as an interdisciplinary approach

which is of value for a diverse array of research settings on software applications.

From 'virtuality' to practice

It is not surprising that ethnographic research on computer usages, and in particular online applications, has shown that treating the Internet as a virtual realm, detached from everyday life, does not do justice to its characteristics as an empirical phenomenon. That is, the notion of virtuality disguises the fact that the coding of software has a concrete reality when software is actually used. Moreover, it leads to overlook the interplay between the kinds of possibilities the design of software offers, and people's actual usage of this technology. Investigations into e-mail communication and chat rooms show that the Internet is treated as a concrete tool or practice rather than an activity in so-called 'cyberspace', separated from everyday activities:

> Trinidians, like others, may invest heavily in relationships and practices that only exist online: it is as breathtaking here as anywhere to find that the financée that has featured in several conversations with someone actually lives in the middle of Australia, and their relationship is based on hours of chatting on ICQ. That is to say, these spaces are important as part of everyday life, not apart of it. (Miller and Slater 2000, 7).

It becomes obvious that the relation between everyday life, and the software's capacity to act upon this life, is crucial when it comes to an understanding of software applications. Thus, the conversations taking place in instant messaging services such as 'ICQ' are happening as a concrete practice within everyday life, not apart from it in some 'virtual' reality behind the screen.[1] In a similar manner, David Machin criticises 'a romanticized image of the cybersurfer as a virtual human being fragmented in cyberspace' that prevents from viewing a certain practice on the Internet within the context in which it is embedded (2002, 124). However, in order to give an account on how 'virtual environments' and software in general are actually practiced in a variety of settings, research on software applications has to look into this interplay.[2] Therefore, this ethnographic approach carefully investigates the software's specific characteristics in relation to different usages and how, in turn, these characteristics restrict and shape people's activities.[3]

The idea to move beyond popular notions such as *virtual* or *cyberspace* when researching digital technologies is also picked up by the community of scholars describing themselves as 'Software Studies'[4]. As Matthew Fuller says in the introduction to the lexicon with the same title, the notion of the 'virtual', and a related understanding of the 'immateriality' of software, downplays the

mechanisms and effects software actually establishes (Fuller 2008, 4). He considers the materiality of software through an investigation into the design, the mechanisms and the assumptions transferred through a particular interface (Fuller 2008, ibid.). For instance, in the case of social network platforms, people are constantly asked to present themselves through various data uploads. Or, concerning open source software (OSS) where the source code is disclosed, the software is constantly modified and ported to new operating systems and processors. The software initialises activities such as sharing and even distribution across diverse settings, as well as shapes people's self-presentation on the Internet.

Investigating software from this perspective means examining its design, i.e. its interface and how it is entangled with other activities, devices and usages. As Matthew Fuller simply puts it, to leave behind the understanding of an immaterial or virtual existence of software entails 'to see what it is, what it does and what it can be coupled with' (2008, 5). More precisely,

> Rather than simply watch and make note on the humans lit by the glow of their monitors it aims to map a rich seam of conjunctions in which the speed and rationality, or slowness and irrationality, of computation meets with its ostensible outside (users, culture, aesthetics) but is not epistemically subordinated by it. (2008, 5).

The different aspects mentioned above highlight a perspective that does not solely analyse people's usages of software, as it tends to appear in the ethnographic research by Miller and Slater (2000) and Machin (2002) mentioned earlier. Rather, it indicates that software must *not only* be considered from the perspective of the user, but may be explored in terms of an understanding of the aesthetic it embodies, specific practices it creates, or other relations it meets in the course of its operations.[5]

To acknowledge the various relations the software generates implies ascribing a creative power not only to humans and their usages, but to the software, too. However, the notion of software studies does not refer to a material determinism that considers a software's operation exclusively in terms of its coding, as if a code is a concept that can be transferred from one place to another without changing. Rather, it suggests including in an analysis the properties made available through the software and the way they get attached to other events, people and objects. As Adrian Mackenzie points out, 'code itself inevitably slips into tangles of competing idioms, practices, techniques and patterns of circulation.' (2006, 5). That is, the code of a particular program does not exist in isolation, but relates when appropriated to interfaces, effects or usages. For example,

in the case of any software installed on a computer that first of all meets a specific processor, i.e. a particular execution unit, and is further adapted in relation to the particular setting it is part of.[6] This is why he claims that 'software in its specificity is not a given. What software does is very intimately linked with how code is read and by whom or what, that is, by person or machine.' (Mackenzie 2006, 6). From this perspective, software comes about through the various ways in which it *assembles* with other properties, usages and effects and in fact, with the *practices* in which it occurs. Indeed, it may be the virus, the hacker, or the software's weakness that can be all recognized as constituting forces triggering a breakdown (Mackenzie 2006, 10).

Practice theory

In a recent text on practice theory, Martha Feldman and Wanda Orlikowski (2011) distinguish between three different types of practice-inspired research. First, an empirical focus where the notion of practice stays rather implicit and the empirical phenomenon investigated is centre of research (cf. Weick 1993). Secondly, a theoretical focus where the notion of practice is made explicit in order to theoretically explain everyday activities and how they are generated, changed and sustained in time. Here, a variety of backgrounds such as Bourdieu's 'implicit logic of practice' (Bourdieu 1976), Giddens' 'situated practices' (Giddens 1984), but also ethnomethodology's attention to everyday practices (Garfinkel 1967; Lynch 2001), are seen as a reference for this focus. New approaches, such as Actor-Network Theory (Latour 2007) and Schatzki's site ontology, are also still seen as part of this account, even though Schatzki's elaborate work on social practices belongs to a third, namely a philosophical engagement with practices. Here, the practice theoretic understanding becomes an ontological statement where the world consists of and is only brought about through practices (cf. Schatzki 1996 and 2002).[7]

I use this classification to provide an overview of the rather diverse field of practice theory and moreover, to position the perspective I am proposing in this article.[8] The practice theoretic understanding I suggest, argues for an explicit theorisation of practices, as I have done in relation to ethnographic research on computer usages. Nevertheless, it is still very much aligned with the empirical case it studies, since it refrains from making too many assumptions beforehand and asks rather openly how the intranet is enacted within different working settings. In this manner it, in fact, looks at the everyday activities that first and foremost bring the software about. Hence, it pursues an empirical focus based on theoretical considerations. As it will be argued

below, the ontology it articulates is one that correlates with the practices, i.e. the doings and sayings that bring about the topic of interest – an 'object' such as software, a certain understanding of a disease, or any other concern (cf. Mol 2002; Marres 2004).[9]

A practice is defined as a 'nexus of doings and sayings' whereas the latter is seen as part of the former (Schatzki 1996, 89). Practice theorists vary in the way they present a rather sophisticated or less elaborated concept of practices, however, they jointly emphasize the situatedness of activities, being very much indebted to the context and situation in which they occur (Mol 2002; Suchman 2007, see also Schatzki 2002). Moreover, the informal logic of all practices is highlighted, since most activities rely fundamentally on the implicit knowledge emerging through practices. Bodies and artefacts have been dedicated as the main bearer of this knowledge and are therefore of great significance for an understanding of practices. In fact, this is why the description and analysis of social practices refer to the 'materiality' of all behaviour which happens by virtue of bodies and artefacts. From this point of view, the knowledge underlying practices is incorporated into human bodies. Moreover, it is a collective accomplishment, temporarily shared with material objects (Reckwitz 2003, 289-90). However, when it comes to describing the involvement of material artefacts, practice theorists offer distinct illustrations; whether objects are not just part, but in the sense of a 'symmetrical anthropology' (Latour 1993), are also bearer of practices, is controversial (Reckwitz 2003, 298)[10].

'Socio-materialities'- a perspective on human and non-human actors

Examining how organisation studies take into account materiality, Wanda Orlikowski points out that it is either ignored, taken for granted or its impact minimized (2007). Moreover, when artefacts are studied, it appears to be always a special case, as if organisations do not engage regularly and daily with materiality (cf. Clash et.al 1994). Overall, existent approaches mostly fail to notice that 'materiality is not an incidental or intermittent aspect of organizational life; it is integral to it' (Orlikoswki 2007, 1436). In the case of research on information technology, effects or interactions with technology are cut off from the focus of the investigation. Orlikowski claims that these perspectives centre either on the technology or on the human engaging with the technology, as if both humans and technologies are always comprehensible and complete entities (cf. Barley 1986). Indeed, a reference to the local conditions under which a particular technology is practiced, is in fact missing. Moreover, technology is always part of historical and

cultural processes and does not exist in vacuum (Orlikowski 2007, 1437). To sum up, the work done by Orlikowski shows that when it comes to research in organisations, the material dimension of everyday practices has so far been neglected. Following Orlikowski, I want to argue that the material is important, especially for an understanding and theorisation of contemporary organisations, transpiring through a variety of information technologies and software applications.

In contrast to this, research done in the realm of Science and Technology Studies (STS) and 'workplace studies', have considered, since the 1980s, the material dimension of practices in the way that human and non-human actors assemble during a variety of work practices (cf. Wajcman 2006; Suchman 2007). Indeed, within this field, materiality is not only seen as part of, but as actively configuring practices. Relating to findings in science studies, Orlikowski (2007, 2010) proposes the notion of 'socio-materiality' to describe a web or network of social as well as material entities. It emphasises the relational capacities without ascribing a genuine substance or characteristic to either humans or non-human actors.

When leaving the idea of substances behind, one is able to look instead at the way associations in the organisation are established; not via some inherent substantial capacity in humans or artefacts, but through assembling and arranging practices. The quality of these associations must be seen as one of 'constitutive entanglement' i.e. a mutual engagement of artefacts and humans that bring about specific practices as well as artefacts (Orlikowski 2007, 1437). For Orlikowski, this view can be seen as a 'post-human' account that strives to 'decenter the human'; that is, it aspires to move beyond a framework that always tends to focus on the way people treat and deal with technology, questioning the 'ontological separation' of humans and artefacts (2007, 1438). As already stated, understanding technologies and software applications involves a more complex perspective than simply focussing on users, since, as argued above, software as well as users are configured through the practices in which they are part of.

I want to emphasise that this analytical shift provides a conception for empirical research on technologies and software applications in particular. From a methodological point of view, the notions of 'constitutive entanglement', and 'socio-materiality' mentioned above refrain from taking for granted the intranet as such, but allows us to study the ways in which it is brought about and mutually constituted through the work setting. Following this shift, it can be assumed that the technology investigated establishes a variety of relations in association with different

settings and practices. My research is in fact intended to give an account of the manifold ways in which the intranet is enacted across the organisation by way of looking at the practices it is part of.

'Praxiography' – a research strategy for socio-material practices

Mapping the entanglement of human and non-human actors and the practices they constitute involves intensive research on situated activities. But, as Lucy Suchman (2005) says, recognising the differences between different sites is not enough. 'If we start from the premise that objects are radically situated and correspondingly multiple, the question shifts from how to explain differences across sites to that of what holds 'an object' together in practice.' (Suchman 2005, 394). That is, acknowledging the multiple realities of objects is necessarily followed by an investigation into how something achieves its status of an object, under which circumstances and in relation to which conditions this takes place. Translated methodologically, this approach investigates artefacts, issues or other concerns by looking at the specific conditions and the practices through which they come into being.

This is in fact how Annemarie Mol (2002) describes her praxiographic research strategy. Studying the different settings in the hospital in which one particular disease, atherosclerosis, comes about, illustrates that through the microscope, atherosclerosis is something else than in the consulting room (Mol 2002, 30). From this perspective, a disease is not something given, but is done again and again with respect to the different settings in which it occurs. Subjects and objects are equally involved and assemble around different activities, in fact *practices*. This is why Mol refers to the idea of 'enactment' when describing the different versions of atherosclerosis;

> It is possible to say that in practice objects are *enacted*. This suggests that activities take place – but leave the actors vague. It also suggests that in the act, and only then and there something *is* – being enacted. […] Thus, an ethnographer/praxiographer out to investigate diseases never isolates these from the practices in which they are, what one may call, *enacted.* (2002, 32-3, italics original).

That is, the term 'to enact', highlights the practical circumstances under which a disease or any other object comes into being. This is done through a variety of instruments, techniques or other organisational routines that all participate in handling a disease, a topic or an object. It is apparent that for Mol, and also for Suchman (2005), something comes into being, or achieves reality, through the activities or, more appropriately, practices. This is why

Mol refers to her concept as moving 'from an epistemological to a praxiographic inquiry into reality' where ontology is not simply given but located and constantly re-accomplished in practices (2002, 32).[11]

The ethnography of practices delivers the methodological programme for Wanda Orlikowski's (2007, 2010) examination of socio-material practices. However, the concept of 'praxiography' adds certain corrections to a common ethnographic research perspective. The basic idea of 'culture', existent as an all-encompassing system imposing certain perceptions and activities on people, is given up in favour of a micro-investigation of practices (Mol 2002, 77 and 176). Moreover, Mol argues that we should not investigate what people think, but how they *experience* their disease, how it happens and takes shape in their life. The practical implications of a particular socio-material configuration, how it forms working practices and in doing so interacts with a variety of other activities in the organisation, is now under examination. In other words, the researchers observe not only people and their sense-making capacities, but the *events* through which an object comes about (cf. Mol 2002, 7 et seqq.). In addition, from a praxiographic point of view, the knowledge embedded in practices is not inaccessibly located in a subject, but can be studied via the examination of practices (Mol 2002, 102 et seq., see also Law 2004, 59-60).

The vocabulary Mol employs to describe the practice-arrangements across different sites is very much context-dependent, so that one needs to appropriate it for other research settings. Yet, the general idea and conception of socio-material practices arranging one another, remains. Through the way the praxiographic inquiry turns the analysis towards the materiality of practices, it becomes possible to study how a specific online environment, that of the intranet, achieves reality across different working settings. As it will be shown, this move requires tracing the practices through which the intranet comes into being. Moreover, this prompts us to ask how these different arrangements relate and coordinate one another.[12]

Researching the intranet as a 'socio-material assemblage'

Within the context of my own research project on intranets in organizations, the theoretical and the methodological framework require the research design to focus on the different departments within these organizations and on their distinct working settings in order to investigate the multiple, dynamic and changing ways in which the intranet comes into being in a variety of situations. Methodologically, this is obtained through participant observation and interviewing as well as a form of document analysis adapted to software.

Observing how the intranet is part of different work practices constitutes a necessary analytical move that makes visible what may seem obvious at first glance; practice theory unveils, in an ethnomethodological fashion, the (perhaps) taken for granted, in order to explain how organisational life proceeds through a device such as the intranet. Davide Nicolini terms this move a 'zooming in' on the relevant doings and sayings that guide a specific practice (2009, 1400; see also Schmidt 2008, 284). From this perspective, a simple activity, such as a telephone call, appears to be a skilful accomplishment involving specific competences and understandings. For my research on the intranet, this perspective entails examining the doings and sayings performed when people sit in front of their screen, working while using and relating to the intranet. The analytical move in this case is to highlight the activities involved in enacting, or doing 'the intranet'; bodily movements as well as the contribution of materialities (for example, the keyboard and the screen) are both significant in order to understand what is happening when the intranet is applied (cf. Schmidt 2008, 290-1). As it can be seen, this praxiographic inquiry focuses on the activities in a particular setting, so as to unravel the situated and local accomplishment underpinning the handling of intranet software. This analytical shift makes apparent what stays otherwise implicit or unknown. Only then one is able comprehend what kind of work is involved in the specific doing of a practice.

In addition to observation, interviews are conducted in order to find out about the practicalities involved in 'doing the intranet'. I am interested in the events occurring around the implementation of the intranet. As stated, the notion of 'event' is used to foreground the activities in which the intranet is part, since only through an exploration of the practical circumstances am I able to understand the practice itself (Mol 2002, 13-20). In the case of the intranet, this means to investigate how and when people are able to use it to accomplish their work, and in which situation it does not make sense at all. Or, under what circumstances the intranet makes work easier or more complicated. In fact, interviews are not used to 'access values, beliefs, or presumed inner motives which supposedly guide the conduct of the practitioners' but to unveil the practical concerns guiding the practice (Nicolini 2009, 1404). These are, in fact, features of the practice, not of the people involved and serve as a guiding principle directing the practice (cf. Schatzki 2005: 480). They have to be discerned from what is said in the interview and are only apparent in the routinely ongoing of the practice. To sum up, the praxiographic research perspective does not assume an 'untouchable', hidden meaning or understanding

behind people's activities. What is apparent on the surface is in fact reality, configured through practices.

Altogether, practice-informed observation and interviewing assist in the unravelling of the practice(s) in which the intranet is enacted. However, this is only one part of a praxiographic inquiry; practices do not only transpire through local activities, but must be seen as connecting to other incidents, since one practice constitutes a resource for another (Nicolini 2009, 1406). In fact, practices affect, change and coordinate each other (cf. Mol 2002, 53 et seq.). This second analytical move is what Nicolini (2009, 1407) calls 'zooming out' of practices; it means, in the case of intranets, we need to look at the way they shape and direct other practices in the company, for example other internal and external communication patterns. [13] Accordingly ,my research investigates how the intranet shapes and directs the overall communication in the company in association with other information exchanges such as meetings or informal gatherings.

This praxiographic inquiry anticipates analytically an arrangement of practices that may be investigated. From this perspective, practices are seen as assemblages that form tight or rather loose connections (cf. Deleuze and Guattari 1987). The notion of assemblage informs my research approach; first of all, it directs my attention to the specific doings and sayings through which practices transpire. Secondly, it refers to the level of other practices where the intranet becomes part of a broader configuration outside of the organizational settings. Indeed, the notion of assemblage underlines that practices never occur alone; they proceed through specific doings and sayings, but at the same time they are part of a larger arrangement of practices. This notion indicates the simultaneous development of practices on small and large scales. Overall, it emphasises the emergent and creative becoming of an object (see also Venn, 2006; Marcus and Saka, 2006).

The case study – preliminary results

Finding a company where I can do my fieldwork turned out to be a critical issue because of the specific situation of organisations and in particular of intranet software. Indeed, the process of getting access to organisations is demanding since they suspect their internal operations are made public and may be at risk if someone from outside takes part in their day to day businesses (van der Waal 2009, 27-8). In addition, intranets are dedicated as the centrepiece of organisations, secured by firewalls and accessible only from inside the organisation. This is why intranets are studied infrequently (Lehmuskallio 2006, 290-1). However, a practice-informed ethnography foregrounds informal data gathering that is investigated

only through an extended participation in the field. Hence, access and a trustful relation with the company are of vital importance. In my case, the initial contact was made through a colleague's friend, working in the middle management. From there I worked myself into the company, over time I established a network of contacts in different departments, either working with or on the Intranet (i.e. the chief editor and the project manager of the Intranet).

The company with which I now do my research works in the telecommunication industry and is one of the largest in the country[14]. I started my fieldwork during a time when the two major branches of the company, the mobile and the landline branches, were merged. In the course of this development, a new intranet has been launched to unite the formerly distinct organisations and, in particular, to improve the overall information and communication exchange in the company. In line with the theoretical and methodological considerations outlined here, as well as taking into account the present situation of the company, my research asks the following questions: (1) how is the intranet enacted within a variety of work practices in different settings of the organisation? (2) Do the practices that bring about the intranet as a specific tool support the general information and communication exchange among employees? (3) Do these enactments contribute to an overall 'togetherness' within the company?[15] Formulated as such, my research examines what an intranet is able to accomplish under the given circumstances. Moreover, it is intended to contribute to future design and implementation of intranet software, since the mapping of practice-arrangements investigates which applications function in particular workplace infrastructures and which properties are overlooked or rejected.[16]

Generally, research on intranet software has pointed out an immense gap between the discourse on intranets and the way these intranets are actually practiced (Pellegrino 2003b). That is, literature on collaboration software presents the intranet as a straightforward tool that can easily be employed in order to introduce changes in communicative customs or to facilitate the exchange of ideas and motivations despite people's dispersed working settings (Collins 2001, see also Pellegrino 2003b). This, in fact, stands in contrast to empirical studies on intranet usages, showing that employees experience this tool as less simple and, in fact, demanding, since it interferes with regular working processes. Therefore, certain applications are often disregarded or people tend to develop their own usages and in doing so undermine intended strategic considerations (see Pellegrino 2003a; Stenmark 2006; Callaghan 2002, 80-1). These findings correspond to the overall

situation of intranets: they are intended for the whole organisation and therefore have to function in a variety of work settings, but at the same time research on technologies and intranets has shown that software only makes sense if it mirrors adequately different working infrastructures (Suchman et. al. 1999; Stenmark 2005). This tension has to be considered each time an intranet is implemented in a company. Accordingly, research on intranet software is essential; I value the practice-based perspective, since through the mapping of practices, one is able to give an (qualitative) insight into how and under which circumstances the intranet functions successfully, and where it fails to do so.

But researching the intranet as a *socio-material assemblage* (cf. Suchman 2007, 268) faces several challenges, which I will discuss next. Foregrounding the relations that bring the intranet about as an object, indicates that one is not able to designate beforehand which practices are of importance for the investigation. Rather, Mol's conception of praxiography suggests that one should be careful in making too many assumptions in advance. Instead, a reflexive account on one's own research approach is favoured. Moreover, practice-based research moves between focusing on certain practices while leaving others aside; in so doing it tries to acknowledge the complexity of the investigated research setting. However, at the same time, the researcher has to decide which practices to focus on, so as not to get lost in the variety of practices one is confronted with. Therefore, a constant analysis and discussion of fieldnotes accompanying the actual fieldwork is vital.

Another challenge I recognise concerns the methods involved. As noted above, interviews are utilised in order to investigate the practicalities implicated in a particular practice, rather than specific intentions or motives of people. This move entails an analytical abstraction from what is stated in the interview, in order to be able to say something about the practice. Again, it implies a reflexive account in response to what one is actually investigating and the need to develop a clear understanding of the studied practice-arrangement. This is only achieved through an extended participation in the field, which brings me to the last challenge I want to point out. Different research settings also offer distinct possibilities for participation, and particularly in the case of organisations, access and an extended period of fieldwork is not easily obtained. However, the practice-based research presupposes diving into local circumstances, so as to gain an understanding of the situated activities organising a practice. It challenges, in fact, the researcher's individual ability to establish an ongoing and trustful relationship with the company.

Conclusion

The research approach presented here constitutes a valuable resource for a variety of research settings studying the dissemination of software applications in contemporary societies. It questions an understanding of software that treats it as a virtual, i.e. hidden force behind the computer screen. Beyond an ethnographic understanding, it foregrounds the materiality of software by referring to the practices, i.e. doings and sayings, of which the software is part. From this point of view, an artefact is not just a given but first of all constituted through its relations, i.e. through the activities or practices it is part of and which it is likewise carrying. It is therefore of particular value in the case of software since the focus on materiality considers the software and its entanglement with different (organisational) settings.

I have illustrated the methodological implications stemming from this framework by presenting a praxiographic research strategy that investigates the different sites in which the software achieves a certain reality in relation to the socio-material practices it is entangled with. Yet, this research approach faces several methodological challenges that are worth exploring so as to design an appropriate research setting. The praxiographic analysis presupposes access to the sites and situations in which the practices of interest occur. This approach can be relevant to various research settings, helping researchers understand what a software does, how it affiliates with people's communication online and offline, and while doing so, configures our everyday life.

Endnotes

[1] Helen Kennedy's text on Internet identity research confirms Miller and Slater's findings; in fact, when researching people's 'virtual' identities on the Internet she points out that research has 'to look at online contexts of offline selves, in order to comprehend virtual life fully.' (2006, 861). With that said, she revises to some extent the work done by Sherry Turkle (1995).

[2] The concept of 'virtual ethnography' attends to the different space-time formations software applications offer and joins the understanding that the Internet must not be seen as a social sphere separated from everyday life. See Hine (2000).

[3] A similar argument has been made by Adrian Mackenzie in his book Cutting Code (2006), where he refers to the same authors (Castells, Rheingold and research by Miller and Slater). Apparently, these authors illustrate well the discourse existent during the 1990s, and the challenge of this attitude at the beginning of the 2000s.

[4] See http://lab.softwarestudies.com/ (accessed on February 17, 2011).

[5] For an illuminating insight into the aesthetic of computer and software, see Goriunova and Shulgin (2008).

[6] As it can be seen, the term 'usage' is now one amongst others. As it will be shown, the practice theoretic perspective I propose here moves away from centring the human in order to look at the practices in which the intranet is part of. This is why I later turn to the notion of 'assemblage' emphasising the creative effects when different elements associate with each other.

[7] Feldman and Orlikowski refer to research on knowledge and learning that especially in organisation studies is well explored from the perspective of practice theory (Wenger 1998, see also Brown and Duguid 2001). Recently, research on power issues, so far rather excluded, experiences a growing attention (Contu and Willmott 2003, Weizmann 2011).

[8] One may think of other differentiations, taking into account the different backgrounds of practice theory and especially Actor-Network Theory. However, this undertaking would go beyond the scope of this article, which is why I opted for the rather pragmatic categorisation that Feldman and Orlikowski (2011) provide: it gives me the possibility to position the perspective my article seeks to bring forward.

[9] The idea of moving from an implicit to an explicit theorisation has, in fact, been picked up by researchers within different sub-areas in the social sciences, such as media studies. As Nick Couldry points out, an advantage of a practice theoretic perspective for media research is the fact that it turns away from simply reading media as text and refrains from drawing on given categories such as consumption or audience so as to embed it in the activities which first of all bring different media settings about (Couldry 2004, 117 and 125). It follows that the concept of practices, chosen 'not out of ethnographic habit', as John Postill self-critically remarks, (2010, 16) but deliberately conceptualised, provides a framework for media research that leaves space to an empirical investigation of activities, or better practices, and explains how different media and their production are first of all brought about.

[10] See Reckwitz (2002) for a revealing discussion of materiality in social and cultural theory.

[11] As already mentioned above, Mol's praxiographic understanding does two things at once that turn her approach into a philosophical inspired engagement. Firstly, her study on medical knowledge via the focus on practices rejects the existence of solid and stable objects. That is, one does not ask in a Kantian fashion 'how am I able to approach reality?' but acknowledges that via practices, reality is constantly achieved anew. Secondly, the idea of a universal knowledge is similarly given up, the question 'what am I able to know?' changes into an (ethnographic) investigation of how knowledge emerges through practice-arrangements (Mol 2002, 5). Being is now located in practices. Thus, a discussion about truth and the right or wrong representation of objects and subjects can be left aside, a topic quite extensively debated in the social sciences with respect to relevant research methods. But Mol's understanding oversteps this subject-object divide and instead, shows that a reflective discussion of one's own research approach is favoured. How-

ever, my analysis of Mol's praxiography takes place in the context of a theoretical and methodological framework for research on information technologies; for this reason, I do not consider in detail her philosophical move at this point, but focus on her concept's practical applicability for empirical research.

[12] Mol's praxiography stems from a close engagement with Actor-Network-Theory (ANT) that treats materiality as inherent to - and constitutive of - the social. However, it differs in the way the notion of practice – instead of network, or association – is conceptualised, even though the two concepts correspond to each other, for instance in the way they provide a descriptive vocabulary and abstain from preconceived definitions and categories. See Mol on ANT/Latour (2002, 30 et seqq. and 61 et seqq.) as well as Latour (2007) and Law (2007).

[13] Nicolini shows that the aspect of 'zooming out' might even be extended outside of the organisation, for example by comparing contemporary work practices across different organisations. As it can be seen, from a praxeological perspective, a distinction between micro and macro level is negligible, since larger phenomena are recognized as the result of local practices (Nicolini 2009, 1394-5, see also Mol 2002, 179 and Latour 2007,169 and 219).
[14] The country is kept anonymous here for ethical reasons.

[15] Strictly speaking, the second and third research questions are not genuine practice theoretic, but inspired by practice theory. They are phrased as such in order to consider the current situation of the company in the analysis.

[16] I want to underline again that the actual fieldwork of my project is still ongoing; therefore, I am unable to present at this stage an analysis on the different work practices bringing about the intranet but discuss the overall theoretical/ methodological framework of my work.

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