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Multiple Social Media in the Workplace: Contradictions and Congruencies

Abstract

In this paper we report an investigation on the use of multiple social media in knowledge work and explore the contribution of activity theory for such a study. As social media are increasingly adopted at work, there is a demand to understand how they are being incorporated. This study focuses on how social media may improve or reduce coherence in work activities, and for this purpose we use activity theory as an analytical lens to conceptualise social media usage in a Scandinavian software development company. The qualitative data, consisting of interviews and observations, were analysed in order to capture the mediating role of social media for information sharing within and across work activities. We found social media in general helpful to maintain coherence in terms of sharing work related information, improving ambient awareness, as well as for socialising, but they also caused inconsistencies in use and adoption. In addition, we found that social media served different purposes in different activity systems, causing both contradictions and congruencies; what was seen as a benefit for some work activities, appeared as a limitation for others (e.g., concerning pace and aims of information sharing). In our findings through the lens of activity theory we observed how objects, although they were shared, were fractionalised in networked activities. Our conclusion is that despite the still un-optimised functionality, social media do bring coherence in work activities in a decentralised work environment.

Keywords

Enterprise Social Media, Activity Theory, Knowledge Work, Information Sharing

Introduction

The research reported in this article studies the role(s) of social media in modern ways of working through an activity theory lens. There is an ongoing shift from traditional modular work to more decentralised, dynamic and networked forms of working (Engeström, 2008; Spinuzzi, 2008; Nardi *et al*., 2002). Today's knowledge intensive work is often arranged in temporary project teams, taking advantage of different expertise and cooperation to address shared problems (Spinuzzi, 2012; Spinuzzi, 2014a). In line with this, knowledge workers depend increasingly upon technology to communicate, collaborate and coordinate in order to bind such – at least seemingly – ad-hoc work activities together (Spinuzzi, 2015). Social media have emerged as a potentially useful collection of technologies for this type of work, due to their informal, flexible and collaborative nature (Hasan & Pfaff, 2012; Davison *et al*., 2013). McAfee (2006) predicted

how these technologies would be suitable for knowledge work characterised as spontaneous, unstructured and informal. He saw them as an opportunity to "knit together an enterprise" (p. 22) and make work patterns and processes more visible and coherent across the organisation.

An examination of previous literature on social media at work reveals that early research often focused upon the introduction of individual tools within a workplace (e.g., a blog or wiki) and concentrated on novel technical features and their usage; little attention was given to their development and long-term usage in context (Leonardi *et al*., 2013). Later studies have adopted a more ecological approach in order to identify consequences of social media use and subsequent ways of working with them. Stocker *et al*. (2012) suggest that the actual benefit of social media "only manifests itself when people make sense of and incorporate them into their day-to-day work routines" (p.348). In agreement, Leonardi *et al.* (2013) call for further research exploring how social media enable and constrain "...activities through which work is accomplished because it is these very dynamics that constitute and perpetuate organisations" (p.2).

McAfee (2006) was among the first to identify two key challenges related to the use of social media at work: firstly, knowledge workers might not adopt nor engage in the platforms; secondly, even if knowledge workers do adopt and engage, they might not use the platforms as expected, consistently or effectively. A fundamental challenge in dealing with social media at work is the possibility of strengths turning to weaknesses, i.e. the flexibility of social media create a range of opportunities, allowing the users to interpret and apply them in many different and incoherent ways. Nevertheless, social media are predicted to bring both strategic and economic advantages for organisations (e.g., Chui *et al*., 2012; Leonardi *et al*., 2013; Kane 2015), which provides motivation to develop – both empirical and theoretical – understanding of how social media incorporate into work, and how they may improve or reduce coherence for work activities (Raeth *et al.*, 2009; Treem & Leonardi, 2012). Subsequently, there is a need for research beyond the occurrences of social media use, a shift of focus to the consequences of the use, as it proves an increasingly important area of research within the information systems field.

To increase the understanding of social media integration into work, activity theory appears to be a promising theoretical framework. Activity theory has gained a strong foothold within the area of information systems research, analysing technology in contexts where social and technical aspects intertwine (Allen *et al*., 2013), although only used in a few studies on enterprise social media (e.g., Stolley, 2009; Hasan & Pfaff, 2012). It proves particularly useful to conceptualise complex real-world settings where interrelationship between people, mediating tools and a cultural-historical setting co-evolve (e.g., Nardi, 1996; Crawford & Hasan, 2006; Hasan & Banna, 2012). The fundamental purpose of an information system is to support users' activities, and activity theory places "...the user and the user's activities in context, rather than placing the system itself at the centre of the evaluation process"

(Hasan & Banna, 2012). It allows social media to be situated in their wider context, as well as in relation to specific work activities, rather than studying the phenomena as an isolated novel technology.

The research presented here contributes to understanding the role of social media at work. The approach sets a twofold research aim, the first being empirically oriented, attempting to provide examples of the benefits and challenges by using multiple social media tools at work. This aim is formulated as the following research question: *How do knowledge workers use multiple social media to maintain coherence within and across work activities?* The second aim is methodologically oriented, spurring from the first; in order to address the research question above, we need to contextually conceptualise and analyse social media as mediating tools in the midst of the activities of which they become a part. The fluidity of work teams, projects and processes across the organisation involves tensions, contradictions and congruencies around social media integration, and understanding this complexity requires an analytical frame of certain holistic scalability. Since activity theory has proven useful as an analytical tool in previous information systems research, we have chosen to pose a follow-up research question that explores: *How can activity theory make sense of multiple social media use in work organisations?*

To address the research questions, we study the use of social media in a Scandinavian software consultancy company (SME) making comprehensive use of multiple social media tools. This study offers a sociocultural analysis for how social media can accommodate and support work activities in modern knowledge work; we describe in detail how different people made social media meaningful in their daily information sharing and identify the contradictions and congruencies that emerged. The reminder of the article begins by presenting the findings from earlier research related to the use and coherence of enterprise social media in work organisations, followed by a description of how we apply activity theory to frame the analytical reconstruction of this empirical case. In the next section, our research methods are introduced along with a presentation of the chosen empirical case. We then present the research findings from the study on enterprise social media usage within and between activity systems in terms of contradictions and congruencies. Finally, we conclude discussing how social media have influenced coherence in work activities, reviewing the application of activity theory in this context and outlining the contributions of this study.

Previous Research on Enterprise Social Media

Social media have become part of our working lives in many fields, and new technologies are disrupting traditional ways of carrying out work (McAfee, 2006; Kaplan & Haenlein, 2010; Leonardi *et al.*, 2013). The multiple tools and issues involved are often referred to as *enterprise social media*. Enterprise social media is seen as a potentially useful collection of technologies for knowledge work, and defined as: “Web-based platforms that allows workers to: (1) communicate messages with specific coworkers or broadcast messages to everyone in the organisation; (2) explicitly indicate or implicitly reveal particular

coworkers as communication partners; (3) post, edit, and sort text and files linked to themselves or others; and (4) view the messages, connections, text, and files communicated, posted, edited and sorted by anyone else in the organisation at any time of their choosing." (Leonardi *et al*., 2013, p. 2).

Initially, research on social media in work organisations focused upon *external social media use*; a means of mass communication aimed towards an external audience, such as connecting with customers, the public or other organisations (e.g., Mangold & Faulds, 2009; Culnan *et al*., 2010; Hanna *et al*., 2011). However, there has been a shift in focus towards *internal social media use*. As organisations have adopted social media for information sharing between employees and for creating new connections across organisational boundaries, research efforts are re-directed towards implications for knowledge work (e.g., Hasan & Pfaff, 2012; Majchrzak *et al*., 2006; Davison *et al*., 2013). The brief review of related research literature below addresses the main approaches and findings.

Single Tool Approach

Research on internal social media use has been skewed towards studies of a single type of technology within one organisation, such as wikis (e.g., Majchrzak *et al*., 2006; Yates *et al*., 2010), blogs (e.g., Efimova & Grundin, 2007; Wattal *et al*., 2009), microblogs (e.g., Zhao & Rosson, 2009; Müller & Stocker, 2011), and social networking sites (Steinfield *et al*., 2009; Skeels & Grundin, 2009; Richter & Riemer, 2009). The purpose of these studies was to understand the opportunities and challenges in adopting particular social media, exploring how the technology is perceived and why it is used. For example, DiMicco et al. (2008) found employees using a social networking site allowing 'social browsing' within the studied organisation, developed weak ties to a larger number of people, rather than to reinforce their existing networks. In contrast, Richter and Riemer (2009) who studied several organisations, found that existing relationships were fostered via a social networking site as well as being used to build networks with others having similar interests.

Aside from building networks, use of social media is often expected to increase information sharing and collaboration within the organisation (McAfee, 2006). This form of "net work" is highlighted by Spinuzzi (2008) who through a study of a telecommunication company illustrated how "everyone is at the boundary", i.e. to get the work done employees can link up and communicate with whomever in the organisation. Previous research also show how motivations in social media use differ between employees (e.g., Richter & Riemer, 2009; DiMicco *et al*., 2008; Agerdal-Hjermind, 2014). Agerdal-Hjermind (2014) highlighted the subjective and multifaceted nature of internal blogging within a government office, identifying four categories of bloggers: the official, the debater, the engineer and the passionate. Similarly, in terms of information sharing, DiMicco (2008) identified three strategies – caring, climbing and campaigning – used by the employees in a social networking site within IBM. Finally, discomfort to

expose one's expertise in social media is another factor that can influence adoption and differ amongst employees (Forsgren & Byström, 2011).

Ecological Approach

The next wave of research shifted the focus towards wider socio-technological issues, generating investigations of multiple social media in conjunction with traditional technologies (e.g., email or telephone). Here the emphasis is on social media's role in modifying communication patterns and their positioning among other kinds of available technologies, as well as amongst themselves. The variety of technologies available for everyday work creates complex environments (Bélanger & Watson-Manheim, 2006), with social media providing more choices. They may also lead to potential conflicts (Yuan *et al*., 2013; Balakrishnan *et al*, 2010; Davison *et al*., 2014) concerning both the channels of information sharing and the content to be shared; the latter relating to switching modes between organisationally produced content and user-generated content (Huang *et al*., 2015).

In terms of maintaining coherence among work activities, social media have been found to be beneficial for knowledge workers. Turner et al. (2010) observed how different types of social media complemented existing systems, rather than replacing them, and how users tended to create their own communication ecologies for particular work activities instead of selecting a single technology. Similarly, Jarrahi and Sawyer (2013) noted that rather than adopting single technologies in isolation, different types of social media were often used simultaneously to facilitate different purposes. They revealed that various social media competed with one another, as employees constantly considered which technology would be most efficient for their particular purposes. Later on, Leonardi (2015) showed quantifiable differences in organisational meta-knowledge after a six-months use of social media. Irrespective of active or passive use, employees with social media access proved a higher level of ambient awareness; specifically concerning *who knows what* and *who knows whom* knowledge. This finding suggests that coherence within work activities can be improved simply by observing other's communication in social media. Additionally, the combination of content and informal meta-data (e.g., likes, ratings, comments) can be used to effectively highlight valuable knowledge created on the platform (Kane, 2015). Mäntymäki & Riemer (2016) found a positive correlation between informal communication and use of social media for problem-solving and generating ideas; indicating a connection between social and utility-oriented goals at work. Further, Ali-Hassan et al. (2015) studied how social media usage impacted upon routine and innovative job performance, showing a positive impact on the formation of social ties from plain entertainment usage, which in turn influenced performance on creative tasks and innovation. On the downside it proved a negative impact on routine work.

In contrast to the general positive view on enterprise social media, previous research shows that social media can provoke issues within organisations. Studying a large multi-national software development

company, Yuan et al. (2013) found that a range of tools were used for information sharing, and how this created redundancies between social media (in this case wiki and communities) as well as legacy systems such as long-standing databases. They highlighted that a single tool cannot satisfy all employee needs, and how differences emerged between groups; for instance were people who worked in R&D more open to use social media, compared to those with less technical tasks (e.g., finance). In a similar fashion, Davison et al. (2014) found a mixture of competition and complement; in some cases, social media had completely replaced existing technologies, whilst it in other cases acted as a complement to more ingrained technologies (e.g., email). Muller et al. (2012) noted how social media were appropriated differently across different groups when creating and using shared resources and forming relationships. The variation of usage could result in isolation of both resources and groups, and create barriers for information sharing as well as reduce networking (Yuan *et al.*, 2013).

A further source for tensions in organisations is communicational ambidexterity, leading to potentially conflicting modes of communication. In their case study of a large multinational organisation, Huang *et al*. (2015) identified tensions between formal systems containing central, organisationally produced content, and decentralised social media, consisting of user-generated content. In addition, Oostervink et al. (2016) observed how the openness of social media caused ambiguity in how to use the available communication systems. They found that employees were torn between the logic of the corporation (usage of social media to improve productivity and efficiency) and the logic of the profession (learning from peers and developing expertise). Finally, other researchers have shown that exposure and usage of social media (e.g., Facebook) in a private context can cause conflicts when similar tools are implemented in the workplace. Koch et al. (2013) recognised a clash between the policies ascribed to the organisation's culture (i.e., security, control and information hoarding) and ideals embedded within the social media tools (free flow of information).

In summary, previous research has so far provided an overall justification for implementing social media at work, as increasingly important platforms for communication and interactions. Yet, many studies still tend to approach social media from merely an instrumental perspective, omitting the impact on organising and understanding of the work *per se*. As researchers continue to study social media, contradictory findings show that their self-organising and open-ended nature makes it difficult to predict the actual adoption and use within the workplace, and how they contribute to maintaining coherence in work activities. Arguably, there is a need for more theoretical and empirical understanding on how the fluid, expansive and intangible nature of social media will affect work activities and the wider organisation. To move in this direction, we adopt the theoretical lens of activity theory to study the coherence social media can bring to work activities, as well as their opposite effect.

Activity Theory Framework

This study draws upon activity theory to explore how social media influences work activities in the context of knowledge work. Activity theory provides a strong framework to capture complex, real-world settings, such as the workplace, as they evolve over time, and the role technology plays within these (e.g., Karanasios & Allen, 2014, Allen et al., 2011; Hasan & Pfaff, 2012). The theory situates practices of people as the unit of analysis, rather than observing the whole organisation (Blackler, 2009) or a specific, individual user (Nardi, 1996). Within the context of this study we argue that it is more useful to contextualise social media as part of interlinked activity systems to gain insights in how they transform everyday work; how they permeate different levels of work and reveal related contradictions, tensions and possible congruencies.

Activity System

In particular, we make use of the concept activity systems for our analysis (Engeström, 1987). The basic idea was developed by Leont'ev (1978) who conceptualised activity system as the interrelationship between *subject*, *object* and *tools*. Subject is the agent (individual or collective) who acts upon an object (motive of the activity) with the means of cultural-historical tools (material and conceptual). Activities can also be described as "a form of doing directed to an object" (Kuutti, 1996, p. 27). The concept of object is promising as an analytical concept, as it emphasies the analysis towards what people attempt to transform (Blackler, 2009). In respect to this study, the object helps to explain not only "how" but "why" (Nardi, 2005) social media are used for work. Leont'ev (1981) also emphasised the hierarchical structure of an activity as being enacted through "interlinked, tool-mediated actions by which actors collectively engage, enact, and pursue an evolving object" (Foot, 2001, p. 61). This means that individual actions mediated by social media can be interpreted within a frame of work activity system and the wider context of work.

Developing the theory further, Engeström (1987) stressed the need to include social and collective components of an activity system, thus incorporating further mediators such as community (the related group of people that also engage in achieving the object), rules and norms (establish procedures), and division of labour (how work is organised). Further, Engeström's view on activity system holds a strong account for its constant development and transformation.

In activity theory terms, tools have a fundamental impact on human activities and vice versa. People's activities are seen being influenced by the tools they are using as well as the tools being influenced by the usage in a dialectic, socio-technical relationship (Barab *et al*., 2004). In addition, every tool is situated in a specific context where it "embodies modes of action when it is encountered within a specific cultural-historical milieu and used with a particular objective" (Spinuzzi, 2003, p. 40). Studying social media as

mediating tools allows us to explore both how social media mediate activities as well as how their users amend the usage. As social media typically are open-ended and develop organically, the dialectic relationship becomes highly relevant.

Interlinked Activity Systems

For this work, we specifically build on the notion of interrelated or networked activity systems (Engeström, 2001; Spinuzzi, 2008; 2015) as a way to explore how multiple social media tools are used not only within activity system but also *between* activity systems. Spinuzzi (2008) describes the study of interrelated activities as being 'woven', pointing towards a process over time where activities form connections, merge and divide as contradictions develop and resolve. As knowledge work depends on dynamic configurations of collaborations between different groups of people (Spinuzzi, 2008), it becomes limiting to consider the development of work from one single view in an activity. This point has been emphasised by activity theorists expressing the need for further development of the theory as activities cross boundaries (e.g., Engeström *et al*., 1995; Nardi *et al.,* 2002, Engeström, 2008). Engeström (2001) stressed the importance of extending the analysis of a single activity to multiple (two or more) activity systems, which share or construct an object in a network. Typically, each activity system has its own object, but as activities interact, a potentially shared or jointly constructed object may evolve. A focus on interrelated activity systems is useful for research emphasising the ways social media create positive or negative consequences for emerging forms of working across boundaries.

Contradictions and Congruencies

Finally, the analysis of contradiction (Engeström, 1987) and the related concept of congruency (Allen *et al*., 2013; Karanasios & Allen, 2014) are relevant as they accentuate tensions, modes of stability, and potential future development surrounding social media in work activities. Engeström (2005, p. 314) compares contradictions in activity systems to a "virtual disturbance-and innovation-producing machine" and sees them as a fundamental part of human activities. Introduction of technology like social media is seldom a straightforward process as the presence of contradictions reveals; it implies complications and leads to unexpected avoidance or misuse (Hasu, 2000) along with possible contributions towards innovative solutions at work. The meaning of contradiction opens up for analysis on how tensions have been managed in the past, as well as how these tensions can be handled in the future (Blackler, 2009).

According to Engeström (1987) there are four types of contradiction (see Figure 1). Primary contradictions focus on tensions within one component of an activity system, e.g. within subject, tools, division of labour. Secondary contradictions occur between two components of the system, for instance between a subject and rules and norms. Tertiary contradictions can emerge between the current activity and the development of a more advanced form of this activity. Finally, the quaternary contradictions occur

between the central activity and the neighbouring activities. In contrast to contradiction, congruency indicates periods of balance, harmony and stabilisation in an activity system (Allen *et al*., 2013; Karanasios & Allen, 2014). Together these concepts form a cyclic feedback loop where contradictions are solved by modifications in the activity, a development that leads to a temporary stable state. Thus, searching for contradictions and congruencies may help to understand how social media is adopted and integrated into the workplace, as well as highlighting potential future innovations and improvements.

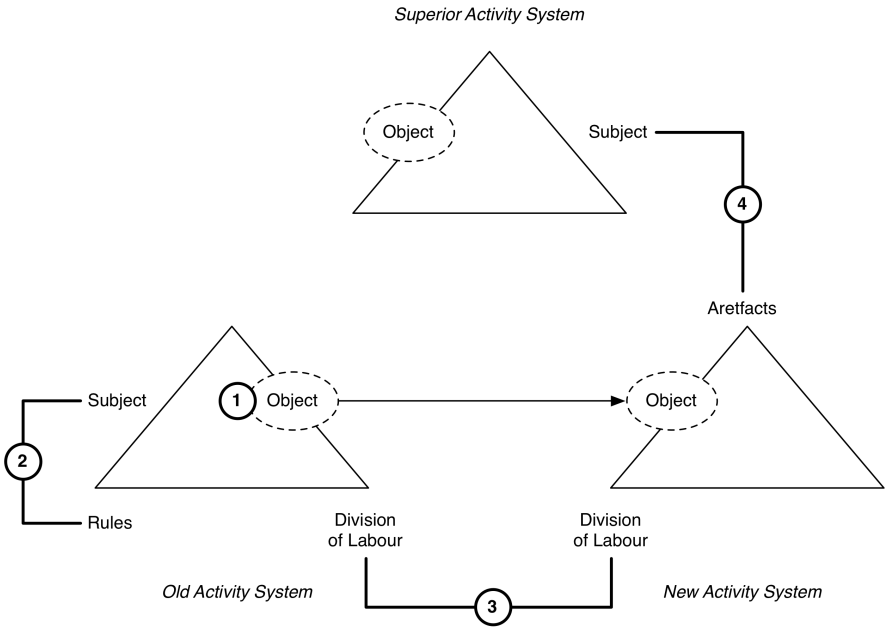

Figure 1: Four types of contradiction (adapted from Engeström, 2001): Primary contradiction within one component (1); secondary contradiction between components of an activity system (2); tertiary contradiction between different forms of an activity system; and quaternary contradiction between neighbouring activity systems (4).

Methods

Data Collection and Analysis

Inspired by research on social interaction and use of technology in the workplace (Heath *et al*., 2000; Nardi & O'Day, 1999; Ybema *et al*., 2009), an extensive qualitative case-study was conducted between the end of 2012 and the beginning of 2014, in a small-to-medium sized software consultancy and development company in Scandinavia – NordServ (fictional name to maintain anonymity). A case-study approach was chosen due to the exploratory nature of the research, and the characteristics of the research questions. The case study approach is common within qualitative inquiry (e.g., Patton, 1990), and useful when the researcher is facing a contemporary complex social phenomena, such as social

media. The approach is holistic and in-depth, allowing to capture subtle nuances in everyday situations in a real-life setting.

NordServ was chosen as an information-rich case (Patton, 1990) of a modern knowledge-intensive company having integrated a rich set of social media tools into the workplace. The initial entry into the company was gained through a network of personal connections. Key contacts facilitated the familiarisation processes and provided access to the company and its members, internal documentation and communication tools. This was helpful in developing an understanding of the organisation, its history, rules and norms, and in turn let us build trust and credibility in the organisation (Patton, 1990). Information about the planned research project, its purpose and design was shared from the start throughout NordServ.

Data was collected via the following multiple qualitative methods: employee interviews, indirect participant observation (on site and through social media), shadowing of a customer project and review of organisational documentation. The data collection resulted in both rich and multifaceted material of which this paper focuses mainly upon the interview data concerned with information sharing via social media. In total 21 knowledge workers were interviewed after a purposive sampling selection process had been conducted (Marshall, 1996), focusing on their expected knowledgeability for the study topic. The interviewees had a mixture of backgrounds, duration of employment, gender and work roles. They were involved in software development, IT-support, marketing and communication, sales, management, design and research. Interviews were carried out face-to-face on the company site, with one exception of using video conference system. The interviews were conducted as semi-structured, designed around themes including: information use and sharing in everyday work and the support of technology (especially social media) for these activities; social media perception and usage in private and professional contexts; the general organisational culture. The interviews remained open for emerging interesting topics from additional dialogue with the interviewees. Each interview lasted between 1.5-2 hours, all of them recorded and transcribed verbatim. Notes were also taken based on indirect participant observation (Bryman, 2005) as interactions and situations unfolded during the study. Used in combination with interviews, observations made it possible to capture not only what people were saying, but also what they were doing within the studied context. The original language for all data collected was a Scandinavian language, and the extracts used in the results section were translated to English by the first author.

During the course of the study, a large amount of data was generated: interview scripts, notes and organisational documents. In order to trim the data down to a manageable information base, Miles and Huberman's (1994) advice on data reduction was applied, meaning that the data set was further organised, irrelevant parts discarded and summarised when appropriate. The data analysis followed an iterative procedure, and the data themselves were organised and analysed via qualitative data analysis

software (Atlas.ti). The first step was to code segments of data (Miles and Huberman, 1994). Based on the research aim and theoretical framework (i.e., activity theory), a basic set of initial codes were applied to the material. The codes were useful to comprehend complex real world data and organise them in a structured and meaningful way (Yamagata-Lynch, 2010). As not all parts of the data could be neatly "fitted" into the initial codes, open coding was used as a complement (Corbin & Strauss, 2008). Throughout these steps codes were refined and rearranged. Finally, axial coding (Corbin & Strauss, 2008) was applied to find connections and relations between the initial codes and open codes. The process was iterative, going back and forth in the data to identify patterns and explanations related to activity systems (Miles and Huberman, 1994).

The Case: NordServ

The studied company, NordServ, founded about a decade ago, has around 100 employees geographically distributed across six offices throughout Scandinavia (at the time of the data collection). The company operates as an IT consultancy in areas such as: software engineering, service provision, user experience design and information management. It is a relatively small, agile, modern company, where work is constantly evolving and highly dependent on collaboration between people (e.g., Spinuzzi, 2015). The management has a minimal top-down structure, few rules and regulations; allowing the culture to rest on general openness to new ideas as well as development of innovative solutions. The open-space office, including a joint meeting and recreation areas, facilitates informal collaboration and reduces physical barriers between employees. An agile, project-based structure is promoted by the company, teaming up talented employees with mixed expertise. There is a strong focus on non-routine, context-specific problem solving, output being intangible value-added solutions (Drucker, 1999). Further, the employees deal with multiple roles and are involved in a range of tasks, with frequent "context-switches". The leadership is oriented towards coaching, and employees are given both freedom and responsibility to act and make decisions. The classical management principles such as command and control are disregarded by the company; rather, information flows and decision-making processes are flexible and informal (see 'Adhocracies' by Mintzberg, 1979).

Consequently, this fluctuating way of organising both the work and the workplace meant that people were more dependent on building relations and communicating frequently with each other (Spinuzzi, 2015). To facilitate communication, the company has implemented multiple social media tools (e.g., forum, social networking site and wiki) as part of the digital work environment, shown in Figure 2. The motivation for implementing these tools came by as a result of employee initiatives to extend their communication and information sharing options. Their effort was supported by the management, who encouraged the employees to explore new ways of managing work. This in turn reflected the lack of formal policies and guidance on how the multiple social media tools should be used, as well as an absence of moderation of content shared across these tools (i.e. informal content can freely mix with formal content).

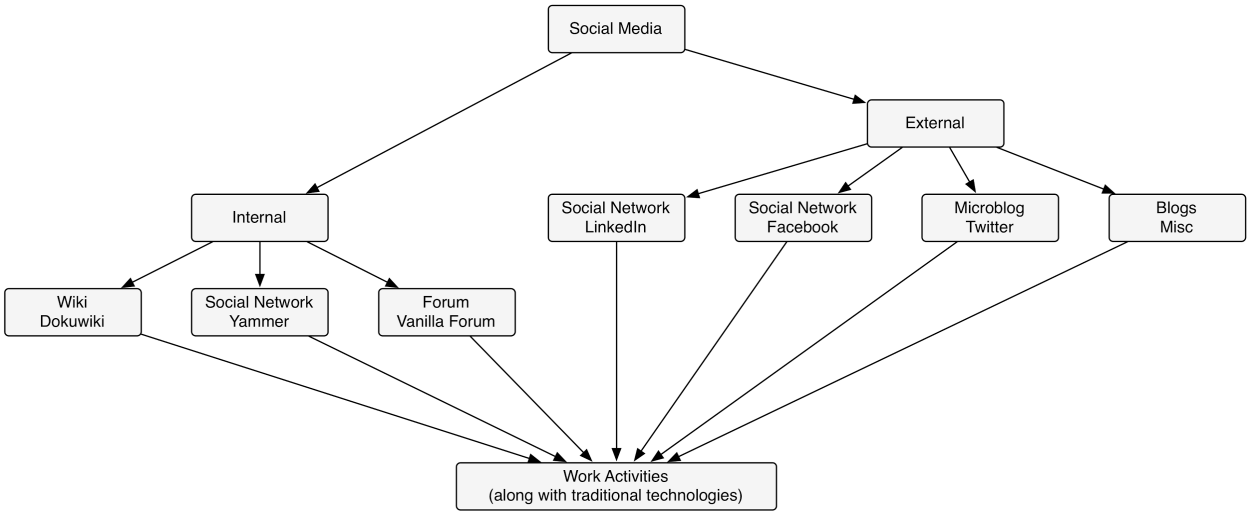

Figure 2: Multiple social media used in everyday work within NordServ

Findings

Three Activity Systems and their Objects within Agile Projects

The aim of this section is to identify how the activity systems (and their objects) made use of multiple social media tools within NordServ. In identifying the objects, we situate social media in a meaningful work context, enabling us to learn the motives for social media use. As building software services is the primary function of NordServ, we first identified the Development activity system, encompassing the actions associated with design, development and maintenance of software solutions. As employees can be members of different teams and engage in multiple projects, use of an activity system provides a stable abstraction over these dynamic aspects. The next two activity systems to be identified were Sales and Production Management, both important as support of the Development activity system but with their own purpose, motive and work tasks. Two further activity systems were identified (Financial Matters and System Support), but were deemed to be separate from the main activity systems and thus excluded from the analysis.

Whilst the efforts of the three activity systems contributed towards the successful completion of projects, each were set with different motives, complicating the task of settling upon a shared object. This became evident during the interviews:

> I think the business goals are slightly different based on which process you're in. So in here [pointing at the sales process diagram], customer satisfaction is probably the highest one. If you're in here [production management], the profitability variable is highest. If you're in here [talent management], the employee satisfaction is probably the highest one. (Production manager)

The projects encompassed objects such as satisfied customer, customer relationship, high-quality product, smooth collaboration, and financial profit. However, these were elusive and evolving targets. As one Sales representative remarked:

> I would say that our processes always start with getting involved with a certain aspect (...) you agree on this and that, on what is supposed to be delivered. But it doesn't work like that in reality. We agree upon one thing but the deliverable ... this will change into something completely different. (Sales representative)

The majority of employees worked as developers, i.e. within Development. Making software involved a wide range of actions, such as requirements analysis, system design, implementation, documentation and deployment. The developers' primary goal was to create high-quality software solutions satisfying specifications and advancing the state of projects. Another related motive for developers was to document useful knowledge (e.g., tutorials and components developed in client solutions) for future use by other developers. Developers often worked on several projects simultaneously and used information systems to keep abreast of each project, including established and common communication tools (email, intranet, chat), software development systems (version control system) and social media platforms (Yammer, forum, wiki).

> For this [software development] you need information or knowledge about different methods, tools and so on related to what can we do and how. Then you need information on that we are actually doing, what we do in different projects, the status on our own components and own code. (Developer)

Within Sales, employees faced a high degree of uncertainty in their work. Typically, they were in contact with current and potential clients (identifying requirements and liaising between clients and project teams) and assessing the companies' different projects and services in order to identify new business possibilities.

> With the things we do, it is quite difficult to have a long-term view (…) we don't know what we will do in half a year. It's all up to us to make new businesses and develop new ideas for our clients. (Sales representatives)

They organised their work independently from project teams, depended however on information sharing in order to conduct their tasks: "*There is a great need to stay updated at all times, as doing so improves the ability to sell significantly, the challenge is to know what is going on in other offices*" (Sales representative). This connected them to both production managers and developers: "*What we sell needs to be transformed into something someone is able to do*" (Sales representative). Sales' primary motives were satisfying clients, developing future sales opportunities, and a desire to become a sales-oriented organisation:

> There is a strong collaboration between project managers and people who are developing projects in order to make them view things from a wider perspective. Not only solve their task, but look for new tasks for our clients. (Sales representative)

> Consultants should be actively thinking about sales in order to become a ‘sales-oriented organisation’. That is the important thing (...) I am trying to collaborate with as many people as possible and involve as many as I can in this process. It is critical in making this office working. (Sales representative)

A considerate amount of work within Production Management occurred on a case-by-case basis and focused on ongoing operational needs. Thus, Production Management was closely involved with the software solutions, viewing the object from an economic perspective, as the main interest was ensuring sufficient provision of resources and project budgets being kept. They also collaborated with sales representatives on existing and future clients. Another, more general desire distinct from any particular project, was to maintain general awareness of things going on throughout the entire company. This relates to the production manager’s role as the company’s hub making strategic decisions that gave rise to conflicts with the objects of the other activity systems:

> An example of a tension is when a project manager is pressured from the production manager to stay on budget, but at the same time developers are not happy doing work-arounds or quick fixes that they think are inferior solutions. (Production manager)

This illustrated a clear tension between the objects of Development and Production Management. Another tension identified between Production Management and Sales was finding a balance within client relationships:

> The salesperson wants to keep the client happy at all costs, because he sees them as a potential client further down the line. Production may understand this strategic situation, but needs to ensure short-term profitability as well as consider long term 'potential'. (Production manager)

In light of differing motives, efforts were needed to bind the objects tighter together, indicating how they are closely related yet specific to one or more activity systems (see Figure 3). This mix of objects is a natural consequence of the variety of work occurring within projects, indicating a need for a closer analysis of the contradictions and congruencies. This helps to compare how motives across activity systems relate to their use (or not) of social media.

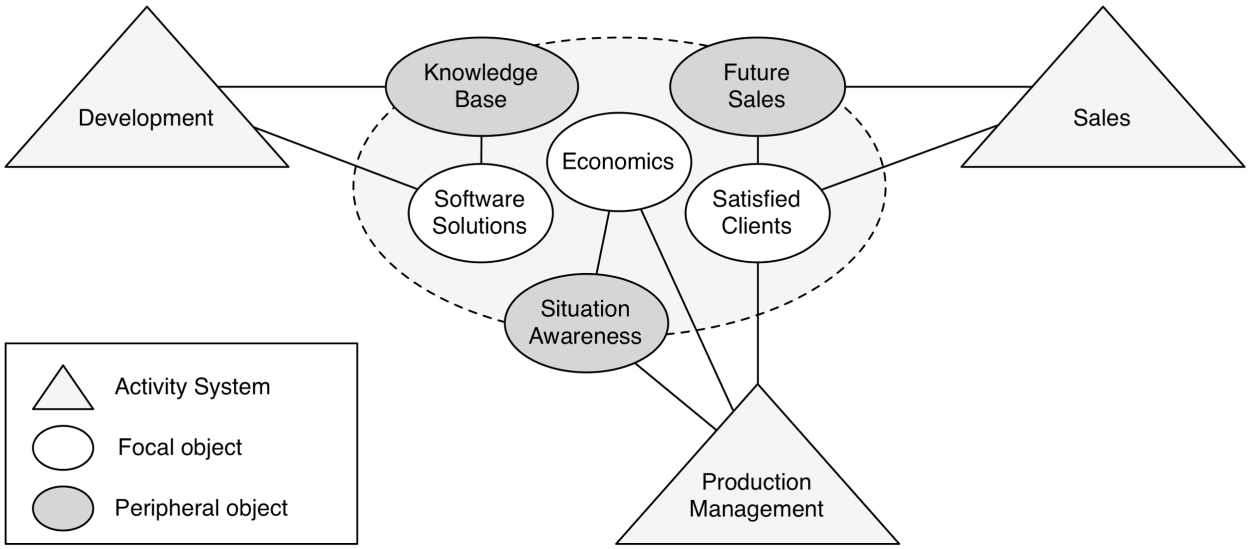

Figure 3: Summary of three interrelated activity systems and their objects within a software project. Triangles denote the activity systems; the dotted oval denotes a project as a collective object; the white ovals are focal objects and the darker grey ovals peripheral objects of each activity system.

Congruencies within Single Activity Systems

Within Development, a notable congruency related to the use of social media was the increased transparency in the community, mainly in terms of inter-project communication, and to some extent with others across the wider company: "*One assumes somewhat that people interested in learning new things are there [in Yammer]*" *(Developer)*. Sharing updates and news in Yammer was common, like: "*We've used this thing, it's awesome, you should also use it*" (Developer), as well as linking to other social media: "*...we have done this, for more information, check it out on the wiki*" (Developer). Such information was valuable to gain new skills, ideas and inspirations, the openness preventing people from "re-inventing the wheel". Previously they had experienced an incident with two offices developing the same technical solution without knowing about each other's efforts.

A second identified congruency was the preservation and sharing of business critical information, that is, information on in-house technical components. By sharing locally produced information in a wiki, new employees could get information only available from internal sources. A recently recruited developer remarked: "*Sometimes, when you have questions, when there is something new, and you don't want to disturb anyone, or my coding buddy is not here, it's good to have the wiki*" (Developer). Other information shared in the wiki related to in-house best practices and 'how-to' guides. Information in the wiki had a more 'complete' feel, and was more static compared with other social media, such as the forum or Yammer. The aim was saving time and effort by prohibiting developers from discussing the same questions repeatedly. In this case, information sharing mediated by social media supported both the focal

(software solutions) and peripheral (knowledge base) objects of the Development activity system; developers were both sharing knowledge via social media and benefitting from prior knowledge when creating new software solutions.

> The structure is as follows [in the wiki]: here are the components, information about them and you can click on a component and get information on who is involved, how to use it, and potential developments. The things you write here are available at any time. There are no discussions (...) You could use the Yammer pages for it but (...) it is merely for more persistent information. (Developer)

Moving from Development to Sales and Production Management, the use of social media was not as wide ranging. Within both activity systems we identified a single and related congruency in terms of horizon scanning; Sales was oriented towards future contracts and Production Management towards situation awareness. Within Sales, there was a clear motive towards finding new clients, and external social media, such as Facebook and LinkedIn, were useful in identifying future business. Being part of online groups was seen as a benefit where potential clients were present and communicating with each other. In these dialogues Sales discovered valuable client information and contacts, facilitating further sales activities. However, in both networks, Sales representatives adopted a passive and cautious communication strategy. Facebook and LinkedIn were not places for Sales to directly promote the company. As one salesperson put it: “One small mistake in such public fora could result in severe consequences to the company’s image”.

> There are different Facebook groups with ongoing interesting discussions. You can identify exciting contacts. Although the important thing is not to sell there (...) you have to be careful as to how you express yourself. You can’t go in there and start talking about offers and selling. Then you’re screwed and will be thrown out. (Sales representative)

Production Management used internal social media (Yammer) similarly to take the pulse and find out what was going on within the company. The purpose was to stay updated and identify current issues:

> To get an overall feel of what has been discussed, what is coming up, what is interesting, what people are happy about, or not so happy about. Lots of different things. I find it very interesting. (Production manager)

Social media were also used for passive monitoring on a daily basis, mainly after regular working hours at home:

> I mean I quite often catch up in the evening on what’s been going on (...).I would look at things specifically assigned to me, e.g. if I’m in a thread or if I’m in a discussion. But generally I just glance at everything, to be honest. I just have this “oh, what’s this about, what’s that about” curiosity. (Production manager)

The main differences in the usage of social media within the three activity systems could be summarised as follows: Development adopted an active and constructive approach whereas both Sales and Production Management positioned themselves in a passive, opportunistic and strategic way. Development used social media to build a knowledge base and solve problems, whereas Sales and Production Management focused on expanding their horizons and gather information beyond their own immediate context.

Contradictions within Single Activity Systems

One area of contradiction within Development concerned the response time experienced when using different social media. Each social media tool had an associated 'acceptable response rate', meaning the delay between a developer posting a question and another replying (or not). One developer commented on the difference between the forum and Yammer:

> Then we have the forum which we 'should' use, and I have used it somewhat, but it always feels like if you want to get a quick reply, you will always get it faster in Yammer. In the forum there are always long discussions, and then you have to get people there. It's an ongoing discussion amongst us (...) I know I should use the forum. (Developer)

But even Yammer was considered too slow in situations requiring a quick solution to problems. Developers expressed a preference towards group chat, as it would facilitate information exchange at a much faster pace:

> You don't get a natural and simple informal information flow [in Yammer], it is more like you make an announcement or ask question or raise an issue. For the simple technical day-to-day operations, however, it is not functional in the same way (…) as you do not get direct responses. Yammer is something people use to check updates. Often people will not check Yammer for a whole day. (Developer)

> What I personally miss is a tool where you throw out a question to some random people without the formality of a whole Yammer discussion. It should be short and fast. Like a larger chat room or similar, not used to make life and death decisions. It's more for a quick question… in the way you would talk to the person next to you. (Developer)

In this situation, developers appear to have a firm understanding of the properties of the social media available, without finding them completely useful in all their requirements, that is, they neither help nor hinder the coherence of the work activity. They are simply not fast and informal enough.

A second identified contradiction for Development was the tension between how often and by whom multiple social media were used (e.g., Yammer and the forum), due to their diverse functionalities and

developers' personal preferences. Within NordServ, discussions were observed in the office and in Yammer, concerning information transparency, retrievability and preservation.

> If there is a pretty important message, Yammer is problematic as not everyone is reading everything. People are in Yammer, but for different reasons, sometimes they do not seem to have noticed it. Even though they [developers] are part of the Yammer group (...) it does not seem to be very visible. (Developer)

> We have a lot of tools, maybe too many (...) This is sometimes being discussed; a lot of people just want to focus on their work, but feel they have to monitor Yammer and the forum. (Developer)

One developer explained how posts had been moved from one tool to another, as someone thought it belonged somewhere else. Most developers seemed to share the view on the forum as being suitable for longer discussions, with attached code snippets, whereas this functionality was less supported in Yammer, thus making it difficult to re-find information:

> Information in Yammer is very short-lived (...) no one will see it the day after. Compared with the forum, where the purpose is to create documentation for the next half year (...) there you will be able to see "ah, we took this design decision related to one of our software components". (Developer)

Another developer expressed a similar view:

> Yammer is more transient. Threads disappear and are difficult to retrieve (...) no one cares what happened five days ago (...) But the forum should be more persistent. You will be able to see decisions made a year ago. (...) when we have a discussion both in the forum and in Yammer, it often happens that someone says "can we move this to the forum". (Developer)

Furthermore, developers reported a higher expectation of quality for information shared in the forum, compared with Yammer. Forum posts were both longer and more thoroughly formulated, whereas Yammer posts were shorter and less "packaged". Developers seemed to have an intuitive understanding of expectations on style and content in the forum. One developer noted: *"That is just how people think, in a forum, one has to formulate more".* Another developer explained: "*Comparing the forum with Facebook, on Facebook you may write whatever. However, nobody will post a funny pic in the forum. But there are people doing that in Yammer*".

As Development was the most frequent user group of multiple social media, they consequently generated differing opinions and voices. These generated contradictions within the activity system, concerning both the use of social media tools and the levels of engagement as well as the decisions about where information belonged. As Sales and Production management tended to make more passive use of social media within their respective activity systems, no obvious contradictions were detected amongst them.

However, as explained in the next section, the space in-between activity systems was a fertile ground for finding both congruencies and contradictions.

Linking Activity Systems with Social Media

Within NordServ, social media helped to link different parts of the company together. Studying these linkages between the three activity systems, social media clearly created more opportunities for employees to connect with each other, but not without tensions. The following contradictions and congruencies surfaced in the interview material. Yammer was the most prevalent social media tool, hosting a shared information space between all activity systems. Here people with different work duties and competences met for work and other issues. Thus, it provided a common point of convergence where different undertakings were made explicit. Consequently, interaction in Yammer could often be the seed for new opportunities between activity systems:

> We convey much of what we do to the sales team, so they can use it in other projects. Someone might say [in Yammer] "now, this project went live, we have these cool features". Then sales will say "oh, tell us more" and then there might be an email or a meeting, but it is there [in Yammer] the initial benefits emerge. (Developer)

Furthermore, Yammer provided an efficient way to share information, locate expertise and track past experiences, providing ambient awareness of the wider organisation:

> The important thing is that I get indirect contact with people from another office, whom I normally would not meet (...) I can read about what they write on technical stuff. At least I get a face and some lines of text, things that create a working relationship to that person. So even if I read another person's question and answer which doesn't directly link to my work, it gives me a feeling for that person or an indirect working relationship. (Developer)

Yammer was most appreciated by the employees and considered as an effective way to communicate across the company. As an example, Production management saw the value of Yammer as the company was growing rapidly and employees could make enquiries like: "*Have we done this before? Does anyone have experience? Has anyone else had this problem?*" It helped link all employees across the company and reduced the risk of past efforts being repeated. Clearly this ability to reach out, without fear or formality, contributed to a greater sense of confidence and coherence within the growing company. Furthermore, the congruency common to all activity systems, was the ability to socialise and communicate informally.

> I check Yammer when I take a cup of coffee or if I am waiting for something on my computer out of my control, then I check Yammer and see what type of discussions is going on. (Developer)

Discussing the benefits of Yammer, employees pointed to the lack of rules or regulations, resulting in a relaxed feeling about sharing both work and social content, as well as the perception of Yammer being much less intrusive than email.

> The whole point is that it is an open place [Yammer], “say whatever you like”. You can create any sub-group on whatever topic if you like. Awesome! Nothing such as calling IT and ask them to create it. (Developer)

Employees repeatedly highlighted its value as a common social space, to share light-hearted informal information, and to coordinate non-work related activities.

> I think the nice thing is that it [Yammer] isn't very serious. It doesn’t matter if you write incorrectly. It is so fast that it doesn’t need to be perfect. If you make a spelling mistake, no one cares. I think it is pretty unconstrained. And then the fact that you can use it for different things. A colleague is writing about a skiing competition, announcing “everybody who wants to participate, sign up here”. (Sales representative)

> I’m using Yammer in almost the same way I’m using Facebook, funnily enough. Apart from the question-answer element, it’s almost the same on the social level. I’m using Facebook to have almost like an illusion of a relation to certain people (...) It’s a bit like I have relations at work with people I don’t work with. I think it’s very similar. (Developer)

This point created a motivation to spend more time in Yammer, contributing to a greater sense of community, or “*togetherness and family*”, as one interviewee expressed it. It reflected the relaxed and informal communication in the physical office, where cheerful chats and discussions in general were common, not only during break-times. This was encouraged by the company’s management level that saw the value in creating a friendly working environment both off- and online.

> We’ve no requirements on how to use it [Yammer] or what it should be. There are no rules whatsoever, rather it has become completely self-regulated (...) It is the power of the crowd (...). It’s a very good example of no rules being needed. Things will solve themselves, there is a little bit of trial and error, but then you’ll find a balance. (Founder)

Of particular interest here is the finding that the sharing of informal information strengthens the collegial feeling in the company, which the employees perceived as critical for solving problems and conducting work tasks coherently and efficiently. This suggests that the use of social media might be indirectly beneficial towards more coherent work activities, even when the shared information is regarded irrelevant. The sole activity of doing so tightens the bonds in the company on a general level.

> A very positive thing with this company is how it's ok to fool around, even in super formal posts in Yammer, where you can write a silly reply (...) I think this contributes to a feeling of being one company, especially with those that are far away. (Developer)

However, there were also contradictions and tensions connected with Yammer. In most cases, links across groups were less about direct collaboration on a shared object than it was about meeting individual information needs, or staying connected and updated in diverse activities. One tension experienced by sales representatives was the difficulty in finding appropriate information about the status of new software development, i.e. to get better insights about new products or solutions under development. For Sales, staying updated was critical for managing current client relationships (e.g., conveying project progress) as well as developing future opportunities (e.g., promoting new features). With more potential places to search for information, it might be suggested that several social media options on hand could lead to less coherence. As discussed, not only did developers use a range of social media tools in different ways, they also desired a group chat to support rapid problem solving. However, this would not contribute towards the object of Sales, whose representatives expressed concerns regarding their chance to get involved, seeing that closed groups could potentially create information silos:

> I know there has been a discussion where some developers want to have a more technical chat room with faster communication for themselves (…) but for me, it's very important that there're people with different competences in Yammer, and it's pretty fast and active already. I would see it as a limitation if people started to communicate on a separate network where only technical people are. Then you shut yourself off and I see that as a risk. (Sales representative)

This concern appeared to be well founded. Despite Sales having positive sentiments towards the use of Yammer to broaden their horizons, some within Development expressed little interest in engaging with other groups across the company. Such tensions are reflected below:

> The good thing about Yammer is that you can read content that is quite technical and get insight, even though I'm not involved myself. I can understand other things and get an overview of the different discussions taking place across the organisation, which I think is very important. Should these discussions take place somewhere else, there is a risk you start building small cluster of people that only talk to each other. (Sales representative)

> There are a couple of [Yammer] groups that are relevant. They are the ones for developers (...) these are the ones with value. Then there are groups for different interests in the company, like sales and marketing and these things. Completely irrelevant for me in the position I'm in (...) I don't care if there is a new white paper or if there has been a new sale. If I'm not involved in the project, I don't care to be honest. (Developer)

The above quotation of a particular developer reflects a pattern in which Development focus on using tools to construct solutions and archive useful knowledge (for the benefit of other developers). On the other hand Sales and Production Management participate less actively, if at all, for these purposes, but had a higher dependence on information being shared for their own purposes. However, even when all are participating on a common platform, such as Yammer, further complications occurred due to different ways of communication. One employee noted that even though Yammer was used by all employees, there was noticeable differences in the content and style of communication – developers maintained a technical tone, whilst sales representatives used a marketing-orientated style. As there are no established rules for how and what to communicate in Yammer, groups continued to maintain their own specific rules and norms, which could play a divisive role in reducing coherence in different work activities.

Discussion

This paper was motivated by two research questions: how do knowledge workers use multiple social media to maintain coherence within and across work activities? And consequently, how can activity theory make sense of multiple social media use in work organisations? In response to the first question, we found that social media in general help maintaining coherence in terms of sharing work related information, improving ambient awareness and for socialising. There exist, however, cases where negative effects emerge, such as inconsistent use or lack of adoption. Regarding the second question, activity theory proved to be a very capable framework for describing and analysing how social media supported work activities as part of the wider socio-cultural context in modern knowledge work. The use of interrelated activity systems and contradictions and congruencies all helped to contribute to a deeper understanding of how social media become embedded within and across work activities, and how they can transform what people do and how they do it. We will address these findings below, starting with our second aim concerning the usefulness of activity theory to study social media, and thereafter discussing the impact of social media on maintaining coherence.

Improving Analytical Depth with Activity Theory

In this paper we wanted to explore the contributions of studying social media in the workplace from an activity theory perspective. Relatively few workplace studies have applied activity theory to social media use (with some exceptions, e.g. Stolley, 2009; Hasan & Pfaff, 2012) despite being particularly valuable in the wider field of information systems (e.g., Allen *et al*., 2011; Crawford & Hasan, 2006; Hasan & Banna, 2012). By adopting an activity theory perspective, several aspects were identified as being useful.

Firstly, the activity theory framework provided the ability to study social media in-depth as part of a collective, tool-mediated and object-oriented activity system (Kaptelinin & Nardi, 2006). This structure helped us move away from an individual user separated from context (Nardi, 1996), analysing them within

a higher-level activity system where socio-cultural elements are captured. Using activity systems as the unit of analysis, people's individual actions mediated by social media could be interpreted towards the achievement of different (and potentially shared) objects. Thus, the notion of object was useful as it supported a more situated analysis and explanation as to how and why social media were adopted or not in certain types of work. The implication being a considerably deeper understanding of social media in workplace settings, beyond the study of isolated novel features and individual behaviour. In short, we could obtain a more holistic view.

Secondly, activity theory also allowed us to model work as networks of interrelated activity systems to capture more complex and ad-hoc working arrangements, as commonly encountered in knowledge work (Spinuzzi, 2015). Hence, it was motivated to extend the analysis from one single activity system (e.g., only study Development) to a more integrated view across boundaries (Development, Sales and Production Management) to understand where social media fitted in-between the activity systems. As the findings showed, much of the positives relating to social media were linked to raising ambient awareness and permitting informal communication, whilst the negatives linked to differences in use and concerns about information not being shared openly. It was therefore enlightening to focus on interlinked activity systems in order to consider both the differences between activity systems and social media use, as well as a means to investigate the vague and amorphous uses of social media (in particular Yammer in this case) in-between activity systems. These findings are challenging to map or measure, yet they appear to be critical in gaining coherence with social media. Consequently, activity theory has had a positive impact on the study of social media through its ability to conceptualise both the networking and the work activity.

Finally, during the course of the study, several contradictions (Engeström, 1987; 2001) and congruencies (Allen *et al*., 2013; Karanasios & Allen, 2014) were identified. These two related concepts contributed towards the research aims, useful as they were in highlighting situations of imbalance as well as stability as a consequence of social media use. As others have observed, people only make sense of social media through its use, which can only emerge over time (Stocker *et al*., 2012; Leonardi *et al*., 2013). This enabled an important first step to construct a deeper understanding of what happens when multiple social media are used in work activities, and what changes and developments may evolve as a consequence of their implementation. Furthermore, the identification of the contradictions and congruencies emerging between activity systems provides more explanations for why social media succeed, stagnate, or fail. Given the far-reaching nature of social media, with the ability to widely permeate both work and leisure activities throughout an organisation, there is a strong need for an analytical lens that can make visible the hidden opportunities, issues and tensions that may otherwise go unnoticed and unresolved. Activity theory provides a positive step in that direction.

The Implications of Multiple Social Media for Coherence

The potential of social media within the workplace has been well established by previous research (Leonardi et al., 2013; Jaharri & Sawyer, 2013). In this study we posed a more specific question of whether social media was improving or reducing coherence in work activities. Previous literature reveals cases of social media improving coherence (or at least not diminishing it), with counter-examples finding a negative effect. By adopting activity theory in studying social media use within an organisation, we focussed on work activities to explore this double-edged nature in a wider socio-cultural context.

In terms of bringing coherence to work activities, the findings provided ample support across all three activity systems (Development, Sales and Production Management). Developers were found to make use of multiple social media tools for a range of information sharing requirements, from supporting updates and discussions (via Yammer or the forum) to archiving technical knowledge (in the wiki), which one tool would have struggled to satisfy. Subsequently the availability of different tools allowed the developers to create their own 'communication ecologies' (Davison *et al*., 2014). This supports findings from earlier studies that determined that users make sense of multiple social media tools (e.g., Turner *et al*., 2010; Jarrahi and Sawyer, 2013). Whilst the presence of multiple tools involved conflicts and redundancies, we suggest that the developers' rich technical background was a contributing factor towards congruency regarding the tools within this specific activity system. Development was also the only activity system explicitly expressing a desire to explore and adopt even more technologies, like a group chat in response to the contradiction of the existing tools not being fast enough for solving everyday problems.

In contrast, Sales and Production management were found to benefit from horizon scanning and situation awareness, but only through Yammer. Yammer developed to a platform for both socialisation and formal work activity (e.g., to announce new features as well as being used for posting invites to post-work events). It kept its relatively informal character; all employees could contribute with no cost (i.e. no required formal standard) nor negative consequences (i.e. no risk of appearing unprofessional). In contrast, the wiki and the forum became the more 'serious' social media tools, adopting a technical style displaying depth of content, implicitly signalling where important material should be archived (the wiki) or discussed thoroughly (the forum). Nevertheless, in line with previous findings all activity systems benefited from the increased ambient awareness the social media provided (Leonardi, 2015). In particular, its use for informal communication and socialisation was perceived beneficial for everyone (Mäntymäki & Riemer, 2016). These increasingly 'peripheral objects' of activity systems, which social media seem to be, are potentially important areas for future investigation.

Despite the positive contribution towards coherence, this study also found evidence of social media having negative effects. Referring to the findings, in the activity system of Development, a number of contradictions surfaced. The contradictions related to developers having a preference for the quickest

option, e.g. it was faster to ask questions in Yammer, even though developers knew it would be worth checking the wiki/forum first. In addition, developers did not necessarily agree where information should go and occasionally moved it to the 'right' place. Within the other activity systems, Sales expressed a concern how many isolated tools might make it difficult to find the 'seeds of ideas' leading to new initiatives. In particular, Sales expressed fear of communication silos being created as a result of introducing new and less open platforms (like the desired group chat for developers). This illustrates how differing opinions concerning the use of the tools are being negotiated, as part of ongoing development within any "community of multiple points of view, traditions and interests" (Engeström 2001, p. 136). As more general conclusion from these findings, we suggest that a study of integration of multiple social media requires an awareness of how one work activity may have indirect effects on the others.

In terms of social media strategy, NordServ's management chose not to enforce rules or regulations regarding their use in the company. Rather, they consciously encouraged employees to experiment and promoted open communication across the organisation. This links to previous research suggesting that employees need to make sense of social media through use of them in practice (Stocker *et al*., 2012; Leonardi *et al.*, 2013). The wider implication here is that allowing unconstrained use of social media has both positive and negative consequences. Multiple social media can find their shape and purpose across different activity systems over time without rules and regulations, however this might need strategic review to assess effectiveness. This is particularly important if the potential for innovation, resulting from cycles of contradictions and congruencies, are to be enabled in workplace activity systems.

These findings are not without shortcomings. Firstly, the study focused on one company and the findings are less generalisable. The study was also conducted within a domain that is technically literate where tools are probably adopted more easily. Furthermore, the duration of the study did not afford the opportunity to monitor the development of activity systems over a longer timeframe, thus not allowing changes and their consequences to be observed. Secondly, despite the overall benefits of activity theory, there are some important limitations to consider. One limitation is that there is no explicit consideration of communication patterns within activity systems, let alone between them (Wells, 2002). Moreover, activity theory makes "rather unclear distinctions between the role of instrumental mediation and that of communicative mediation" (Bødker & Andersen, 2005, p. 360). Addressing the distinction in activity theory is particularly relevant for studies of social media as these tools are both communicative and instrumental in terms of mediation. A further limitation is how to address fleeting connections between activity systems reconfiguring themselves depending on the situation. As previous literature indicates, social media are used to create cross-boundary connections (DiMicco et al., 2008; Richter and Riemer, 2009), which makes the development towards a fourth generation of activity theory focusing on the dynamism of networked activity systems both necessary and promising (Engeström, 2009; Spinuzzi, 2012; 2014). Finally, it can be difficult to define the scope of the object within activity systems, and even

more so within networked activity systems (Spinuzzi, 2011). There is a risk to choose objects that are vague or too large, lacking clear and meaningful boundaries, especially within the field of knowledge work. In summary, whilst there are some methodological and theoretical shortcomings, the approach presented here can be adapted to different organisations and domains and would be a useful source of future studies to investigate the complex case of social media.

Conclusion

In this paper we have applied an activity theory perspective towards developing a better understanding of multiple social media tools, and how they help maintain coherence within and between work activities. This approach was motivated by the need to consider the deeper impact of social media beyond the features of the tools and the novel use cases they can support. This work contributes to the body of research on information systems, and in particular enterprise social media, in two important ways.

Firstly, the study provides a rich empirical account of the value gained and issues encountered when using multiple social media for information sharing within an agile, project-based company. This study offers a sociocultural analysis for how social media can accommodate and support work activities in modern knowledge work, we describe in detail how different people made social media meaningful in their daily information sharing as well as identifying the contradictions and congruencies that emerged. These findings broaden our understanding of social media as information systems for knowledge work, and contribute to the discussion around social media as a potential linking force in networked organisations.

Secondly, we have demonstrated how activity theory provides a holistic lens to study the complex phenomena of multiple social media in the workplace. The study has shown how social media can be contextualised as part of people's tool-mediated, object-oriented 'doings' (Kuutti, 1996). We have been able to provide deeper explanations as to how and why social media are used in a work setting. The concepts of contradiction and congruency were particularly useful to illuminate potential needs for change and development within and between work activities. Hence, we argue how activity theory has the necessary capacity to support a multi-faceted analysis of the many challenges created by the integration of social media into organisational arrangements.

Moreover, as work organisations with less formalised structure continue to grow as an alternative workplace model within the knowledge industry and elsewhere, we need frameworks that can cope with the inherent complexities. The experience of this work adds to the argument of activity theory being one fruitful approach. However, given the trend towards decentralised, dynamic and digital workplaces, more attention must be given to networked activities and intertwined activity systems. This could be an important direction for future development of activity theory and its application in information system research.

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