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THE EMERGENCE OF SHARING AND GAINING KNOWLEDGE: TOWARDS SMARTWORK IN HEALTHCARE

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Research in Progress

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Abstract

The subject of this research-in-progress paper is on digitalization of healthcare in relation to work and learning. The aim is to explore the introduction of social technologies for collaboration and knowledge sharing at work. The empirical data is from a pilot study in the Swedish healthcare sector, involving emergency resident physicians, medical library team, and hospital management. Preliminary findings shed lights on some of the tensions and conflicting perspectives related to the digital workplace, and how to balance between them seems to be the challenge (personal vs. professional; medical vs. administrative; flexibility vs. institutionalization). This study also indicates that there is potential for collegial collaboration, knowledge sharing, and learning and argue that better integration in daily practice and new ways of working may contribute to meet demand for health-related IT competence for healthcare staff and the benefit of patients as well.

Keywords: Collaboration, Knowledge sharing, Digitalization, Workplace learning, Healthcare

1 Introduction

Digitalization of society changes the ways we live, work and learn, posing challenges and opportunities from an individual, organizational and technological perspective. Through the integration of social media into organizations, internal communication has evolved from mainly formal, top-down, to co-creation of content and peer-to-peer communication and collaboration across organizational and geographical borders (Berger 2014; Leonardi 2013a). While the new technologies bring benefits regarding availability and flexibility to work from anywhere at any time and support for knowledge sharing and informal learning (Hague and Logan 2009; Mazmanian et al. 2013), there is related risks and complexity as well. For example, recent trends toward IT consumerization, i.e. the blending of consumer and enterprise technologies at work (Harris et al. 2012) allow for people to use their choice of IT for work and learning purposes. But then again may also cause stress and tensions due to blurring boundaries between personal and professional life and concerns related to privacy and security issues (Köffer 2015; Yoo 2012).

The healthcare sector is one area facing challenges due to increased digitalization. Due to patient centric care, personalized health services and access to online health information, the role of patients and the physician-patient relationship is changing (Ball 2001; Higgins 2011) raising demand for new competence (European Commission 2015; Shelton et al. 2016). While the importance of training and continuous learning for the medical profession is well known, less attention has been paid to how physicians learn in the workplace (Isah 2015; Van De Wiel et al. 2011). Research suggests that use of social media could enhance informal learning, tacit knowledge sharing and spread of specialized knowledge (Kind and Evans 2015; Panahi 2014), although ethical and legal aspects need to be further addressed, and overall more research is needed in this area (Grajales III 2014). Information systems (IS) and related research within the health sector have focused on the design, implementation and use of Health Information Technology in the workplace, such as electronic medical records or decision support systems in

clinical settings (e.g. Fichman et al. 2011; Fitzpatrick and Ellingsen 2013). Primarily addressing the impact on healthcare performance and issues related to adoption (Agarwal et al. 2010), privacy concerns, interoperability and resistance to change (Romanow et al. 2012). However, the role and potential of IT as support for informal learning has not been explored comprehensively (cf. Za 2015, Köffer 2015) and further research on the use of digital technologies for knowledge sharing in non-office settings such as healthcare has been called for (Waizenegger et al. 2016).

The aim of this research-in-progress paper is to explore emerging changes and challenges related to digital collaboration, in terms of collegial communication, and knowledge sharing at work. The empirical data is from a pilot study in the Swedish healthcare sector, involving emergency resident physicians, medical library team and hospital management and administration. The preliminary findings are discussed within the context of sociotechnical perspectives. The research question is: *What are the experienced needs, expectations and challenges of digital collaboration and learning in the workplace, and how can they be understood?*

The structure of the paper proceeds as follows. The second section presents the theoretical background for the research problem, with a focus on the sociotechnical tradition in IS research. The third section presents the research approach and methodology, followed by initial findings and analysis. The final section provides a discussion of the results, expected outcome and concluding remarks, as well as suggestions for future research and the next step.

2 Theoretical background

The Scandinavian school of IS research has a tradition of sociotechnical approaches and user participation, based on a belief that involving the users will improve system development, but also for political reasons aiming at workplace democracy (Bansler 1989; Bjerknes 1995). However, this seems not to be the case with health care information systems, which are often perceived time-consuming, poorly integrated in daily medical practice and not adapted to physicians working methods (The Swedish Agency for Health and Care Services Analysis 2013; Vallo Hult et al. 2016). Due to a history of IT-related problems in healthcare, where, despite documented benefits, many eHealth initiatives have failed in practice, health professionals are often less supportive towards such technologies (van Gemert-Pijnen et al. 2011). Digitalization in public sector (e.g. e-government and e-health) has often been approached from a technocentric perspective, addressed as primary an IT issue (Schuppan, 2010; Ekholm, 2016). Thus technology-driven rather than business or practice-driven (c.f. Bacon and Fitzgerald 2001), whereas the consequences are often equally much or more social than technological. It seems as if physicians, and health care system at large, are still facing much the same issues and problems highlighted by early sociotechnical research, which aimed to combine the perspectives through "joint optimization" of the social and technical and participatory approaches (Mumford 2006). Consequently, a more holistic view may help overcome the extremes of either technologically or too user-oriented approaches and lack of integrated views on information systems in research and practice.

Knowledge of everyday work processes consists to a large extent of tacit knowledge that may be hard to articulate and explain. As characterized by early IS research, needs and demands are hard to express before the future situation has been experienced, and it is easier to accept or reject suggested changes than to take the initiative to make changes (Bødker 1988). Still, a key challenge is to evolve sociotechnical environments that encourage user participation and engagement, not just technically enable and support it (Fischer 2011). In recent years there has been renewed attention to the interplay between the social and the technical, in the context of the digitalization of society and an emergent stream of research on sociomateriality (Cecez-Kecmanovic et al. 2014). While adopting sociotechnical approaches on today's digital workplaces seem highly relevant, digitalization is also challenging the established view of the organization as the central context (Sørensen 2016; Winter et al. 2014). The concept of technical subsystems in early sociotechnical approaches is similar to what scholars today refer to as sociomaterial

practice (Leonardi 2013b), although contemporary meanings often focus on a group's localized experiences around a particular or various technologies, whereas the sociotechnical system refers to the organization as a whole.

3 Methods

This research report preliminary findings from a joint research and development project in Swedish healthcare, where a pilot study was conducted as part of the preparatory work for the introduction of a new intranet, referred to as the digital workplace. The research approach is qualitative, and action research oriented, aiming for knowledge development through collaboration and intervention in real settings, where the researcher takes an active role and engages with people in the project (cf. Baskerville 2004; Kemmis 2009).

The empirical study was conducted in a hospital setting in three groups: Emergency Department (ED), Medical Library (ML) and Hospital Management (HM). Participants were selected to represent different categories of employees, performing various work tasks in both office and non-office settings. The information system in use, a collaboration site provided to all employees, have functions for document management, knowledge sharing, and communication within or between workgroups or projects. Although the study was carried out amongst existing users of the present system, the focus of the pilot study was not to evaluate the particular system but rather to focus on how the participants choose (or not choose) to use the collaboration functions in order to identify general criteria for which features are important to users. The study involved a number of data gathering activities throughout the project, as shown in Figure 1.

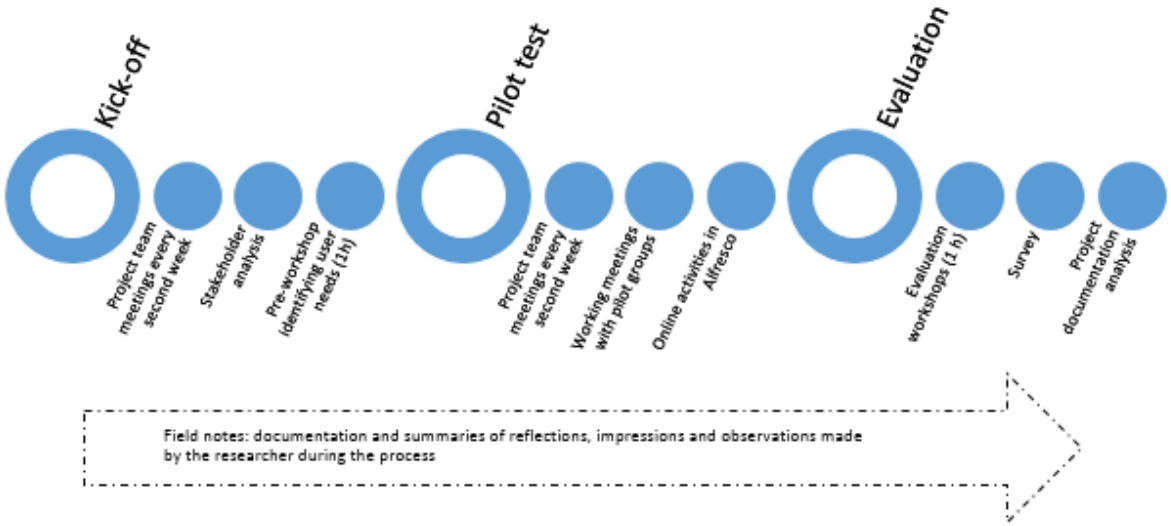

Figure 1. Timeline, activities, and sources.

The empirical data from the pilot project consists of 6 workshops, 15 meetings, formal project documentation (approx. 100 p.) and continuous observations by the researcher. In addition to workshops and meetings where the participants' experiences and views were in focus, online activity (actual use and changes in pattern over time) was monitored and documented. Due to limitations in the administration tool, it was not possible to get log files to the desired extent during pilot test. A survey for evaluation of collaboration groupware, intended for a follow-up study, was also developed and tested in the pilot groups. Analysis was explorative and empirically driven, focusing on the participants' perceptions, experiences and work situation and the relation between technology, organization, and people (sociotechnical perspective). Initial themes derived from the research question and stakeholder analysis, followed by an iterative process of reading and coding of the whole material, merging and adding new themes during the process. Data collection and estimations of the amount of data are specified in Table 1.

Data collection	**Participants**		
	ED	*ML*	*HM*
3 pre-workshop (emergency department, medical library and management)	6	4	3
3 evaluation workshops (emergency department, medical library and management)	4	4	2
7 working meetings (emergency department and management)	3-6	-	2
8 project team status meetings	6-9		
20 researcher field notes (summaries)	-		
Project documentation (approx. 100 p.)	-		
Online activities Alfresco statistics (Size MB*, No of members*, recent activity*, administrator* No of login/month* date of latest login*). Manual compilation (No activities in total, blog posts, comments, uploaded documents, discussion threads, time and dates)	All participants		

Table 1. Data collection and participants

4 Findings

Below follows a brief description of the results of the pilot tests for each group respectively. A comparative summary of stakeholder analysis and initial findings is provided in Table 2 in the final section.

4.1 Emergency Resident Physicians

The physicians emphasized the importance to reach out with important but short-lived information that only applies to the group: *a bulletin board to push quick news, if we are missing staff or drug information*. They also highlighted a need for a better place for shared discussions to replace e-mail, and also for sharing and documenting experiences for learning purposes and reflection: *What did I learn? How can this be applied in practice?* Eventually, this discussion oriented towards 'a living local knowledge bank' for (medical and administrative) matters similar to Wikipedia where everyone helps to keep it updated. Accessibility was addressed as highly important, within and outside of the hospital and from mobile devices, and also the ability to gain direct access to documents. Overall, there was a strong wish for more interconnected systems, fewer logins and adaption to the clinical workflow. There was strong requests for document management to make it easier to organize, structure and search for information, expressed as a desire to be able to control the information, grouping it and get related information.

4.2 Medical Library

For the medical library team the collaboration site function as an important basis for the daily work. Through the home page, the team members reach practical information such as the current schedule and news list, wiki pages for ongoing activities, links to common systems, overall procedures and checklists. The blog is actively used for continuing dialog, discussion, and questions. All team members are posting, and the comment field is used for discussions. The document library and shared documents were perceived useful but a bit cumbersome. On the one hand helping the team to keep documents updated and organized, but at the same time difficult to create one structure that is logical for all. Focus was on actual use and utility, addressed from an individual level: *it really helps with the checklist, because I feel more secure, and it saves time not to have to ask all the time.* But also with emphasize on that it contribute to a sense of group belonging *to see and take responsibility for the whole rather than just your task*, team spirit and commitment to the group: *I get a better understanding and insight into their work, sort of an indirect, informal learning*. From an organizational perspective was argued that: *It increases the quality of work and provide uniformity outward in the organization* and that transparency in communication *also helps to avoid misunderstandings and territorial thinking*.

4.3 Hospital Management

The hospital management aimed at handle all important document management in the team collaboration site. *Quick and easy access* was an important criterion: *before* meetings to register cases and get alerted. *During* meetings to present the current agenda and related documentation presented in the correct order according to the agenda. *After* meeting minutes generated by the status information for automatic archiving and presentation on the intranet. Consequently, smooth document management, to share and present information through various channels but avoid duplicate publishing and parallel versions of documents. Responsive design, ability to read and edit on mobile devices, save and synchronize for offline reading, and secure access to external login was equally important. Another aspect of importance was *user role rights management*, to be able to filter between different information types such as internal work material, to appear only within the group, relevant documents to be published as employee information or further processing in other groupings such as the central cooperation and Board of Directors.

4.4 Summary of initial findings and sociotechnical aspects

A comparative summary of stakeholder analysis and the pilot tests is presented in Table 2 to give an overview of key findings within and across the three groups.

	Emergency Department, Resident Physicians	**Medical Library team**	**Hospital Management**
Stakeholder analysis	*Awareness and continuous learning*	*The informing helping hand*	*Planning and preparation*
Characteristics	• no team site	• active team site	• semiactive team site
Experience of groupware	• inexperienced users	• experienced users	• inexperienced users, one superuser
Request/Need	• need for better support for cooperation and communication	• need for systematizing, documenting, structuring everyday work processes	• need for additional support for case management
	• focus on getting started	• focus on improvements	• focus on workflow process
	• Important aspects: awareness, group learning environment, ease-of-use	• Important aspects: documentation, communication, seamless and mobile access	• Important aspects: planning and preparation, access: before – during – after meetings
Sociotechnical aspects	Initial focus on **practical and technical issues** such as IT problems or specific functions or features, followed by reflections and discussions mainly on **everyday work** aspects Positive views on **the potential** of digital collaboration sites for information sharing and learning, but also shared feelings of frustration due to existing healthcare systems. Wants **simple solutions with digital tools and smart ways to use them for daily work** Combination of aspects on general level: **organizational** (governance, culture), **individual** (IT skills, user benefit, work task) and **technological** (user-friendly,IT-support) While addressing similar aspects, **what they mean** and **the reasons behind** it differ e.g. quick and easy access, digital stress and work-life balance. Also illustrates the complexity, how digitalization of work is about **introducing new ways of working and changing** habits and behaviors, and that this takes time. Call for **participative approaches,** involvement **in real-life work** settings with the systems in use and **engaging the people** using them.		

Table 2. Comparative summary and key findings from pilot tests

5 Discussion

Although the groups were different from each other and laid focus on various aspects of collaboration, they also shared many similar preferences as well and had overall a lot in common on a general level. The findings suggest that digital collaboration sites have potential to increase collegial communication and contribute to knowledge sharing and learning. However, to achieve these positive effects needs to be better integrated into daily practice and include new ways of working. There seem to be conflicting perspectives on several levels. On the one hand was a general need or wish for digital tools to easily and quickly communicate, collaborate and share everyday information. At the same time was little use or knowledge of existing systems and solutions offered by the IT department. There was also a tension from an IT and management perspective, between trying to allow people to communicate in all sorts of ways using digital tools that makes it flexible for them, but at the same time they have to do it in a way that is supported by the IT department. The project formulated overall strategic principles: "Mobile first" and "Work is what you do, not where you go to," stating this not as an IT or communications project but a development project. However, this was from the project management point of view, in practice was quite the opposite perspectives from local management, such as restrictions on the use of smartphones at work or practical aspects work clothes without pockets (so the private phone stays in the locker anyways). In general was a strong tendency to separate the health information environment from the digital workplace (work information environment), and similar between "real" work as in patient care and eHealth from administration such as reading the intranet or e-mails.

Many IT-related problems appear to be more about "socio" than "technical" aspects. Perhaps due to a tradition of centralized standard systems and top-down IT management trying to solve all issues with a silver bullet (one super system). As one of the physicians commented, "*the solution to a problem with an IT system in healthcare is to implement another IT-system*." Both users and management tend to focus on technology aspects on how to use particular systems, but missing aspects about how this is also about introducing new ways of working and changing habits and behaviors. It was interesting that many aspects put forward (digital stress, work-life balance, lack of or conflicting strategies) are similar to the sociotechnical school about "joint optimization" and workplace democracy (Bjerknes 1995; Hirschheim 1989). A challenge acknowledged by more recent research as well. For example, Mazmanian et al. (2013) talk about the autonomy paradox, where professionals describe choosing to use mobile email to work anywhere/anytime, as evidence of personal autonomy. While ending up using it everywhere/all the time and consequently rather diminishing their autonomy in practice (Mazmanian et al. 2013).

While new technologies provide for constant access to information and support for extensive collaboration and knowledge sharing, clearly it also changes work practices, thus posing new and different demands on leadership and teamwork in the workplace. It is noteworthy that the participants in all groups tended to focus at first on the practical and technical issues, such as IT problems or specific functions or features of the particular system. However, following this initial discussion was often more general reflections and discussions on everyday work aspects, such as how shared information means also shared responsibility and the role of digital collaboration for team spirit, engagement, etc. Also highlighting the complexity and how digitalization of work is about introducing new ways of working and changing habits and behaviors. There were also suggestions for improvements regarding the "personal working environment," where better use of IT could facilitate access to patient related information, learning purposes and documentation of experiences. In general, there was a strong focus on the individual perspective, to quick and easy find and search for information, keep updated and work according to latest policies and procedures. Less focus was on one's responsibility to also share information, participate in discussions and contribute with knowledge. Furthermore, collegial learning is an important part of daily learning, but is in practice 'analog' rather than digital, due to established routines and forms for staff meetings and consulting. Indicating that the organization could be missing out on a potential wider network of competence. Knowledge sharing, through social technologies, could help to build a "wisdom of the professional crowd" at work.

6 Conclusion and implications

Preliminary findings from this study indicate that digital collaboration has potential to act as an important knowledge- and experience bank, and may play an important role in creating learning opportunities to support reflection and everyday learning. Throughout the study was a positive view on the potential of collaboration sites for peer learning, while there is a complexity in how IT systems should be introduced and used. Overall, this seems to be related to a combination of factors: organizational (e.g. governance, management and working culture), individual (e.g. IT skills, user benefit) and technological (e.g. useful, user-friendly systems and IT support).

The pilot study has highlighted tensions, and conflicting perspectives on several levels: blurring boundaries of personal and professional; separate views on medical and administrative IT and the flexibility and institutionalization when it comes to allowing people to use their choice of IT while at the same time caring for privacy and security issues. As digital tools become integrated into everyday practice, it's important to recognize that projects and problems that occur to be IT related, could, in fact, be related to other aspects such as lack of communication or management. Developments in the e-health area require new expertise among the medical profession, but also offers opportunities to develop skills as well. Our findings highlight that the introduction and use of digital collaboration for information related activities doing everyday work may contribute to change attitudes, bridging healthcare IT and workplace IT.

In sum, the material is varied and limited to the pilot project. Findings ought to be seen as indicative and having a role in guiding further research and analysis. Whereas this research in process paper has addressed key themes and issues related to sociotechnical perspectives across all three groups, as a consequence there was no room for in-depth analysis of each group respectively. Furthermore, related communication tools such as video meetings, instant messaging/chat, and shared calendar functions were issued in the study but were not further elaborated on at this stage of the research as these features were not the primary focus of the pilot project. A suggestion for further research is to follow-up on the physicians in the emergency clinic, to gain a deeper understanding of motivation and barriers for knowledge sharing in non-office settings in particular. Equally interesting would be to broaden the study to explore and follow how work practices and competence related to the digitalization of workplaces changes over time, at a general level. As for practical implications recommendations from the pilot project, it is important to invest in training, IT-support, and communication so that employees understand the purpose and gain an understanding of why, how and when to use the collaboration site in relation to other systems. Involving HR is considered a critical success factor, because of the changes in work processes due to digitalization. Participative approaches to systems development, seem relevant, since there is obviously a gap between expectations as well as a resistance to change, and also need for more iterative and interactive involvement in real-life work settings with the systems in use and the people using them.

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