Web 2.0 Technologies and Workplace Paradigms to Enable e-Professional Workstyles

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Abstract

This paper explores current and emerging trends in collaborative working and investigates the role of Web 2.0 technologies in establishing networked forms of collaboration across organisational boundaries. The emerging Web 2.0 enabled workplace model recognizes that people are engaged in different tasks to be carried out in parallel, and are part of multiple projects, teams and even organizations. The new forms of collaborative networks enable people and their business environment to increase their productivity and leverage the creative potential of working collaboratively. In particular we explore the domain of managing complex projects. Based on examples of emerging forms of collaborative networks as well as case studies in actual collaborative work processes, we envisage new models of person-based collaboration and study the way they are embedded in organizational networks. The paper concludes in discussing open problems and proposing research themes in the area of networked collaboration of professionals.

1   Introduction

This paper aims to investigate the role of Web 2.0 technologies in shaping the collaborative working environment for professional knowledge workers, and to analyse the potential conditions for success for such Web 2.0-enabled working environments. The Enterprise 2.0 concept (McAfee 2006) is not describing a network of professionals, but a new paradigm of using Web 2.0 technologies (e.g. blogs and wikis) within company intranets. Focus is on informal, less structured, more spontaneous, knowledge based work of companies. As one example, the use of wikis and blogs in a large banking company is mentioned. Particular focus is on the role of collaborating professionals engaged in complex projects crossing organizational boundaries. It has become normal practice for knowledge workers to be involved in many parallel tasks and activities, and to be part of different projects, informal or formal networks and even organizations. At the same time this situation is highly demanding as regards working in distributed and networked settings and in different time zones, collaboration work style when working in such settings, the personal management of large and dynamically changing amounts of information, and the established business processes and coordination mechanisms in organizations knowledge workers belong to.
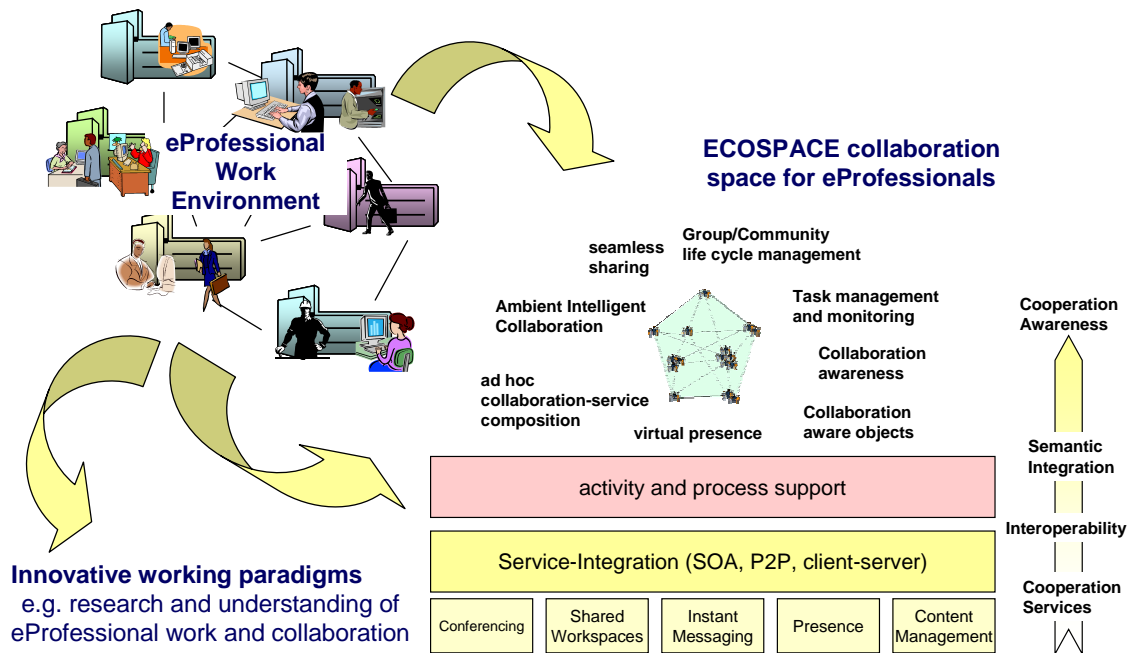
Figure 1: eProfessional paradigm and integrated collaboration space concept of ECOSPACE

The paper is based on early results of the ECOSPACE Integrated Project (Prinz et al 2006; see www.ip-ecospace.org). ECOSPACE aims to explore the vision of eProfessional collaborative working (Figure 1). This vision states that future knowledge workers will engage in seamless, dynamic and creative collaboration across teams, organizations and communities, through a personalised collaborative work environment.

This paper concentrates on emerging work paradigms related to the role of knowledge workers, in relation to the role of Web 2.0 technologies. Chapter 2 provides an overview of the emerging work paradigm of networked collaboration, as a basis for improved understanding of the professional workplace; the work concepts, methods workplace arrangements, workplace IT-infrastructure and organizational context. The professional workplace is not stable and rigid; it is transforming into ever new forms of eProfessional working. Confronting work practice and technology, the current state of the art and trends in Web 2.0 technologies is investigated. Chapter 3 and 4 describes the research approach and a discussion of open problems and present areas of further research, respectively. Chapter 5 presents some key conclusions.

2   Relation to Existing Theories and Work

2.1   Networked Work Emerging Paradigm - The Future Workspace and Web 2.0

Due to the steady progress of technologies and processes for information sharing, communication and collaboration, and due to the forces of competition and globalisation, our work environment has changed and will continue to change, going into the direction of a more virtualized world. As Friedman (2006) has put it, the world has become flat.

This paradigm shift implies that collaboration applications should be designed based on an analysis of the collaboration activities of users in their working environment. For example, when knowledge workers want to provide a document to their colleague they should not think in terms of attaching a file to an e-mail but in terms of sharing this document by simply executing a sharing operation. The underlying cooperation environment should then select the appropriate communication application whether this is e-mail, shared workspace, workflow management or instant messaging, based on technical infrastructure and user preferences.

The role of Web 2.0 technologies in these scenarios is to enable transition from the established thinking in terms of workflow and business processes and from the current rigid workplace IT-

infrastructure to more flexible forms of collaboration capitalizing on personal networking and community style of communication and collaboration. Current IT tools are mainly focusing on supporting or automating existing processes. Current organizational structures, groupware collaboration tools and business models are not yet suitable to enable the transition towards networked work styles. Networked work styles require adaptation of IT tools to the particular characteristics of networked work processes at the micro level. Increasingly, such work styles are developing through using Web 2.0 tools.

2.1.1 Emerging Networks of e-Professionals: Examples

Analysis of literature and available cases shows that there are only a few case study examples of eProfessional networks available. In several projects in the IST priority of the 6th Framework of the European Commission, concepts of professional communities and networked virtual organisations are explored. In the MIT study on 21st Century Organizations (Malone 2003), "interesting organizations" have been studied. Focus was on organisations, not on human networks. However, it resulted in the identification and exploration of the "e-lance economy" concept. Malone (2005) studies various decentralized and networked forms of organization and a trend towards decentralised, even market-based, organisations is postulated. The e-lancer model can be found in various sectors such as the movie industry, construction, and in IT outsourcing. Specialised intermediaries e.g. www.elance.com are offering services such as finding experts.

Concerning one particular example of professional networks, open source software development, a lot is known, however open source style of working lacks the element of business model. Still it has many interesting elements from eProfessional working point of view. A current trend is the close and professional collaboration of major companies (e.g. Nokia Research) with communities of software developers. This leads to interesting and important issues in the area of business models and IPR, which to a large part have not been resolved yet. Another interesting example is China Software Developer Net as described by Yan and Assimakopoulos (2005). Having more than 800.000 members in 2004, its system design and management model has helped them to build a vibrant software virtual community grounded in an attractive business model.

Chesbrough (2003) describes the new phenomenon of open and collaborative innovation. Emphasis is strongly on the importance of business models to govern sustainable collaboration between business entities. The relation with eProfessional ways of working is not explicit but remains potential. Here as in wider forms of open innovation, for example innovation within a supplier network or innovation within the context of regional industry-research networking relations, there is scope for transition to the model of creative communities.

Such a model of creative communities or "creation nets" has been described by Seely Brown and Hagel (2006). Creation nets include tens to thousands of participants from diverse institutional settings collaborating to create new knowledge, to learn from another, and to appropriate and build on one another's work. Such creation nets bare guided by a network organiser, for example in an industrial creation net the Original Design Manufacturer. A creation net has assigned roles and mechanisms for performance monitoring and feedback control. It also has defined protocols for participation. Seeley Brown and Hagel mention a few examples e.g. open source software development, extreme sports networks, and the Li&Fung apparel production network.

An interesting example of an ad-hoc network is the Toyota community (Evans and Wolf 2005). When a fire destroyed specialized machinery for producing valves in a plant of a major supplier of Toyota, risking shutdown of the whole Toyota production system, their supplier network was able to distribute tools, blueprints and materials to produce and deliver valves again within a few days. This was an example of self-organisation without contracts where people and companies stepped in where they could.

Based on the short examples presented above, types and characteristics of eProfessional working styles emerge.

- eProfessional work style is based on communication and collaboration between individuals, not between organizations. However there is a linkage between the two.

- Individuals could be, but not necessarily, members of one or more organizations.

- eProfessional work style is supported by applications enabling human networking ("social software", also mentioned Web 2.0, like conferencing, shared workspace, wikis, blogs etc)

- It should be distinguished between stable human networks and ad-hoc created networks. There will be a life cycle, from inception through operation towards dissolution of a working environment.

- eProfessional working is mostly based on trust and sometimes on contracting (markets; like in the e-lance economy) instead of on control procedures (hierarchies).

2.2 Collaboration Tools and Collaborative Behaviour

The relationship between multi-tasking and collaboration is studied by González and Mark (2005). They are using the concept of work spheres to recognize that work is fragmented: people are involved in multiple working spheres involving different sets of people, and continually change working spheres and collaborative contexts. Individuals have varying states of awareness of their working spheres, renew overviews of their working spheres and strategize on how to manage transitions between contexts. They conclude that system designs to support collaborative work should address the fact that people are engaged in multiple collaborations with continuously changing contexts.

The impact of work settings on team effectiveness has been studied by Teasley, Covi et al (2000) and Bos, Olson et al (2006). From these studies we may conclude that collocated teams have the advantage of easy access to each other, enabling better common understanding and trust building, and increasing productivity. On the other hand there is the danger of collocation "blindness": failure to pay attention to collaborators outside.

Nardi, Whittaker and Schwarz (2004) is one of relatively few studies on personal social networks in the workplace ("intensional networks") and in working across organizational boundaries. It appears that networkers rely heavily on their own personal networks. Social forms are structuring collaboration in the workplace, such as communities of practice, "knotworking" (short-duration combinations of unique people, tasks and tools (examples are in neurosurgery and airline crews), and coalitions. Their main conclusion is that the workplace is not virtual and that social networks are important. New tools are required to enable the building and maintenance of networks.

As a preliminary conclusion it can be said that only few studies are dealing with working in the context of professional and social networks. There is an emerging literature on networking and social awareness. Studies reveal the key factors and processes determining the quality of collaborative work, Interpretation of findings and importance of factors will be dependent on the actual work setting.

3 Research Approach

3.1 ECOSPACE case study research into complex project management

Within ECOSPACE we have undertaken micro-level case studies in selected companies to identify the "work routines" and associated bottlenecks. The theoretical framework underpinning this case study research is Eisenhardt (1989) case study methodology and structuration theory (Orlikowski 2000). Detailed case study questionnaires and script approaches have been prepared. The conceptual model underlying the case study research is focusing on the eProfessional work system (technology use, organizational processes, work practices), and on the role of project characteristics, team member characteristics and organizational environment in shaping this

work system and its performance outcomes in terms of effectiveness, creativity and satisfaction. These cases resulted in detailed descriptions of the actual work processes including clues for improving the work process and related collaborative support tools.

We shortly summarize the preliminary findings resulting from two companies engaged in complex cross-organizational projects: (1) Atkins, a large engineering consultancy in the UK, and (2) De Agostini, a media company in Italy. The key findings from both case complex management studies are related to bottlenecks on day to day coordination and control, problems in collaboration, and bottlenecks related to collaboration tools. As regards collaboration problems and collaboration tools, it appears that there is no common agreement on collaboration tools to be used. A general conclusion is therefore that bottlenecks in collaboration are jointly caused by work related, organizational and technical factors, and consequently there is a need for integrated collaboration solutions and introduction strategies.

3.2   TOWARDS Enterprise collaboration 2.0 - Web 2.0 as a new paradigm

We now turn to a class of web technologies that seem to be highly promising in supporting collaboration and communication in informal networks and communities as well as in the professional workplace.

Collaborating knowledge workers currently see themselves confronted with an increasingly broad range of collaboration support tools. In a McKinsey survey on Web 2.0 usage patterns, business executives respond that they are using Web 2.0 technologies to communicate with customers and business partners and to encourage collaboration inside the company (Bughin and Manyika, 2007). Furthermore, seventy percent are using some combination of these technologies for communicating with their customers. However, which of these tools actually help knowledge workers to collaborate more effectively, efficiently and more pleasurable? What are the potential benefits provided by the technologies that are currently being advertised under the "Web 2.0" label? When to use these tools and when not? And what do enterprises have to do, to make sure that the full potential of these tools can be reached? This chapter addresses these questions by discussing relevant technology developments and by looking at the way these technologies reshape the way knowledge workers collaborate. Furthermore, we identify key success factors, organizational challenges and open research questions.

Enterprise Collaboration 2.0, as we refer to it, is actually not about new technologies; it is more about *how people use technologies to improve the way they communicate in an enterprise setting*, hence the "2.0". Nevertheless, we can observe some developments in technologies that enable new ways of working, sometimes by introducing radically new concepts, sometimes by combining existing ingredients, sometimes just by making existing functionality a lot easier to use. Technologies that currently reshape enterprise collaboration, include tagging, project wikis, project blogs and online social networking, although their full potential and implications for collaboration are not fully clear yet.

4   Findings; Discussion and Challenges

This section describes some key challenges and opportunities for organisations, coupled with some suggestions for developers' agenda.

4.1   Challenges for Organizations

As with other innovations, in order to benefit from the options of Enterprise Collaboration 2.0, an organization needs a receptive culture, both from the side of the knowledge workers and the management. As individuals become more visible as experts through their contributions to blogs and wikis, these new forms of collaboration may actually challenge existing power structures in organizations. However, as we already stated, Enterprise Collaboration 2.0 is more about how people use technologies then about the technologies themselves. The biggest challenge for

organizations is therefore to find out how to motivate people to explore innovative ways of using technologies, how to introduce these technologies to teams and how to make sure your organization benefits most from their potential.

4.2 Opportunities for Organizations

Enterprise Collaboration 2.0 has the potential to increase the effectiveness as well as efficiency of teams, by speeding up the co-creation of knowledge and shortening design cycles. There are clear indications that in order to keep a project team informed, it may be simpler and more effective to use a project blog then to use e-mail. Another example shows that tagging of electronic documents may help to reduce information overload of knowledge workers by providing context to these resources (what is its status, who is working on it, is it a key deliverable). In general, these technologies can improve team effectiveness by providing better collaboration awareness: what is the status of the various activities, what are the dependencies and when and how am I expected to contribute?

4.3 Developers Agenda

As the current Enterprise Collaboration landscape is fragmented, striving for interoperability should be high on the developers' agenda. Especially in settings where knowledge workers participate in various teams, and for different organizations, interoperability of collaborative work environments is essential. As a first step, it seems vital to make the provided functionality accessibility via a web front-end. Instead of aiming at proving integrated solutions, our vision is that software developers should strive to provide the "best of breed" for one or more facets of knowledge worker collaboration. These small pieces should be easy to integrate with others, and it should be easy (and legal!) for others to incorporate them in their services. Connecting such small, interoperable pieces, for instance via RSS or REST principles, is in line with the trend of creating *mash-ups*.

The unpredictability of knowledge worker processes and the speed at which changes occur also have implications on an architectural level: to cope with these dynamics it may be needed to provide ontology descriptions of collaborative services and allow for ad-hoc composition of these services. The objective here should be to design technology that is able to support knowledge worker processes *as they happen*, without incorporating too many assumptions about working practices.

5 Conclusion

Although Enterprise Collaboration 2.0 seems to be able to provide significant opportunities, some open research challenges remain. We have for instance indicated broad guidelines for when to use project blogs and wikis, but more fine-grained insight is needed to understand for which collaboration patterns these technologies provide most benefits. Also the question how to introduce these technologies as well as the new way of working they require in organisations has not fully answered yet. Should such new ways of working be stimulated in a top-down manner, or should one rely on bottom-up emergence? From a technology perspective it is not clear yet how technical support should be designed in order to support collaboration processes *as they happen*. The required flexibility of collaborative services places heavy constraints on the architectural design of collaborative working environments.

Key conditions for the success or Enterprise Collaboration 2.0 seems to be depending on three main factors: providing *personal benefits*, providing *group benefits* and making these technologies *extremely lightweight* to use. Personal benefits can for instance be that the technology is also useful for personal information management, to reduce information overload, or increasing the visibility, expertise and track record of eProfessionals.

Group benefits may result from reducing the complexity of team coordination, keeping group members well-informed about progress, dependencies and expectations, or by providing insight in the track record of others. Technology to support eProfessionals should be designed to be extremely lightweight to use, for instance by making the functionalities available via a web front-end and by providing a good match with and embedding these functionalities in the eProfessional working routines. In an organizational context, choosing for one company-wide collaborative working environment helps to streamline support and creates one learning curve, instead of learning curves for individual products.

As we stated in the introduction of this chapter, Enterprise Collaboration 2.0 is not about new technologies but about *how people use technologies to improve the way they communicate in an enterprise setting*. The way organizations are able to balance personal passion and business objectives will largely determine how much they can benefit from the potential of Enterprise Collaboration 2.0.

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