

Designing for Learning Communities in a Large Enterprise

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ABSTRACT

This position paper presents the research efforts and results of two case studies conducted during the ongoing deployment of online learning communities in a large IT services enterprise. We first provide an overview of the research project and the communities launched, and then present the two case studies. The preliminary findings led to the identification of two problem areas where web-based Collective Intelligence tools can give support: (1) lowering the cost of sharing; (2) lowering the fragmentation of information across multiple information channels. The last part of the paper summarizes two ongoing technological interventions aimed at allowing these professionals to share at a lower cost and manage information across channels. Our findings suggest that new tools can, in fact, address the needs of individuals and task forces, while also promoting participation and new intelligence at the level of larger learning communities.

Author Keywords

CSCW, Collaboration, Communities of Practice, Enterprise, Knowledge Workers, Professional Development, Learning Commitment

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

Global competitive pressures and rapid technological change make organizations a dynamic environment where workers are forced to continuously update their work-related skills and practices. Work and learning are becoming increasingly equivalent (e.g., Tapscott 1995). This convergence is particularly evident in complex, non-routine knowledge work such as the kind involved in crafting and selling services, which is our focus. Successfully selling, implementing, and delivering 'customized' services to clients requires highly skilled work; experience matters. Moreover, this type of industry

appears more exposed to risk from losses of intellectual capital if companies fail to address the problem of knowledge handoff between retiring seniors and junior colleagues (e.g., DeLong 2004). As trends for the corporate IT industry show that the business of providing online services has steadily increased since the 1990s (Cusumano 2008), the problem of supporting professional development and knowledge exchange in this context is likely to become more evident in the future.

Motivating Problem

Forming communities of practices to support learning and development in the workplace represents a promising solution to this problem. In fact, communities of practice are being promoted within many organizations as a way to build competences and social capital: intra-organization groups of workers that share interests, problems, and tips (e.g., Wenger 2002, Probst & Borzillo 2008). We study those explicitly aimed at professional development: i.e. learning communities.

As Web 2.0 tools are increasingly being adopted by global enterprises, we specifically study *computer-supported communities of practice where services professionals with similar job functions in a large enterprise can share knowledge and develop skills*. Although a long tradition of field studies has focused on the practices and tools for exchanging expertise within organizations, the literature is lacking systematic investigations of how learning communities form and what causes their success or failure. Orr reported a classic study of Xerox's field service technicians sharing tips in 1996. A grand challenge for social computing researchers is to develop an understanding of these factors and translate it into tools that successfully foster the growth of learning communities *in a corporate setting* (see how the findings about technicians' practices led Xerox to implement the Eureka system, or the current findings and lessons learned about building online communities Kim 2000, Iriberry and Leroy 2009).

This paper presents the approach and preliminary results of a study of the deployment of online learning communities in a large enterprise, which we will call DocServices. DocServices sells to businesses IT services such as processing of documents, creation of digital repositories, and re-engineering of workflows. In 2007, DocServices employed about 15,000 professionals from more than 150 countries.

The project for deploying the online communities was engineered and conducted by a small team of expert organizers within DocServices. The project was planned during 2007, and the communities were launched between December 2007 and summer 2008. The goal was to promote learning and development among experts with similar job roles and, thus, to increase the efficiency DocServices and the skills of its workers.

Data were collected from the professionals in the first phase of the project before the launch of the communities. As information about the prospective members was processed, a set of community-building initiatives was implemented in the project's second phase for launching each community. These initiatives include professional development programs (i.e., social engineering), such as on-boarding and mentoring programs, and web-based tools (i.e., technical engineering), such as a community Wiki workspace and other web-based collaborative tools. The set of programs and tools implemented were customized based on the information collected in the first phase. In the next sections we describe the research approach (see Figure 1 for an overview) and two case studies. The last part of the paper summarizes two ongoing technological interventions.

RESEARCH BACKGROUND AND APPROACH

Relevance and Goals

A team of researchers has been cooperating with the team of organizers who are running the project. Nine online communities have been launched since December 2007. As one might predict, due to the scale and the multiple factors involved, some cases of community building have been measurably more successful than others. To adequately support these and future communities in DocServices, the goals of this ongoing research project are to:

1. *Understand what factors* are affecting the current learning communities within DocServices by

measuring input and output factors;

2. *Identify design requirements* for programs and tools that can better address the needs of services professionals;
3. *Design and test new tools* for supporting learning and development, while taking into account specific input (e.g., community profile) and output factors.

Data Collection

We analyzed the survey data from the first phase for each of the nine communities (Table 1). 315 responses were collected from members of nine communities (with about 70% average response rate across the communities). The program organizers designed and administered the questionnaire in order to profile the prospective members of each community in terms of: demographics; work function, experience or skills; connectivity and web tools usage; pre-existing learning practices and preferences.

The extended group of organizers and researchers conducted several meetings to share survey data and background information about each community, to explain the programs and tools used for each community, and to discuss the observable effects in each community.

PRELIMINARY RESULTS

Community Profiles

Community Size, Location, and Language

Two communities have fewer than 30 members, two have more than 90 members, and the remaining five have an intermediate number of members, between 30 and 60, approximately.

Regarding the geographic location of the communities, six are based in North America (see NA in Table 1), two are based in Europe (see EU in Table 1), and one includes members from both. 99.4% of all the members speak English fluently.

Name	Function	Size	Location	Tools/Programs
AM	Sales: manage accounts	30-40	EU	Wiki
AP	Sales: develop global alliances	40	NA	Wiki, CoP-Meeting, Certification
BM	Sales: large bids	20	EU	Wiki, Expert Network
PMP	Implementation: craft services	140	NA	Wiki, Expert Network, OnBoarding, Mentoring
PM	Implementation & Delivery: assist	40-50	NA	Wiki, CoP-Meeting, Expert Network, Associat., Certification
GPE	Delivery: manage implementation	50-60	NA	Wiki, OnBoarding
DA	Delivery: on site implementation	90-100	NA, EU	Wiki, CoP-Meeting, OnBoarding, Expert Network, Mentoring
DC	Global services and solutions	30-40	NA	Wiki, CoP-Meeting, Expert Network, Association
EP	Education Professionals	20-30	NA	Wiki, CoP-Meeting, Expert Network, Association

Table 1. Communities. Function, size, location, and launch of the learning communities in North America (NA) and Europe (EU). The set of tools and programs introduced are listed in the rightmost column

Community Function, Member Experience or Skills

The communities were formed among professionals with similar roles within the business cycle of selling services (see Table 1, first and second column). The functions composing this cycle span from sales (AM, AP, BM), to implementation (PMP, PM), and to delivery (GPE, DA). Some communities are differentiated by the global scope of application of their function (AP, BM, DC, EP). One community deals with internal education (EP).

On average, across all the communities, the workers had worked 11.4 years for DocServices. However, the communities have quite different profiles, with members of two communities (DA and BM) having, on average, less shared experience working for the current company, compared to others who are relatively more experienced (GPE, EP). While this does not indicate less actual work experience, it does imply greater costs for building common ground among the members of the more newly formed groups. Moreover, the distribution of the amount of experience within the community is more uniform in some cases (PMP) than in others (DA), where a few members have spent many years at DocServices and most of the other members very few.

The members of some communities have higher management skills compared to others; this is explained in part by differences in community function (and members' job categories). The questionnaire assessed the level of skills in managing manufacturing and business process (Lean Six Sigma certification level). Moreover, the professional origins of the members (prior job category) were different across communities. This suggested that in addition to measuring how knowledge and skills are actually exchanged in each community, it is also important to keep track of the flow of the professionals across communities and from/to the external enterprises.

Connectivity and Web Tools Usage

The majority of the professionals connect to the Internet from their home (96.8%) and office (80.6%); similar results are obtained when asking specifically about connecting to DocServices web-based tools. These results are clearly higher than the US national average for networked workers. On average, 62% of US workers are connected (see survey by Madden and Jones 2008). One fourth of the workers surveyed used Podcasts, Video Sharing Sites, Wikis, Blogs on the Internet. Slightly fewer used Social Networking Sites. The preference for video-based resources online is consistent with the data from the PEW report [Madden & Jones 2008].

The only exception is the DA community, where members are often required to work on site at the client's location. Compared to the other communities, these professionals have significantly lower connectivity to Internet and DocServices web-based tools from office (64%) or home (65%), but relatively higher connectivity from the customer location (57% vs. 25-45%).

These results suggest that these workers surveyed are Internet-savvy with high connectivity compared to their networked peers. Thus, connectivity is likely not an obstacle to accessing Internet and DocServices web resources. The unique connectivity profile of the members of the DA community has important implications for the kind of tools that can adequately support learning within these communities (e.g., accessing online community tools through mobile tools, such as a Blackberry).

By surveying the usage of specific web-based tools across the communities, we find that each has a unique web usage "fingerprint" related to the community needs and task. These tool-experience profiles, when integrated with information about learning practices and preferences (see next section), inform how to best customize learning tools for each online community.

Learning Practices and Preferences

Regarding pre-existing learning practices, we find that, on average, the professionals spent about 10 days per year for formal training and about 8-9 hours per month for *each* of the following informal activities: informal learning (or sharing best practices with colleagues), reading books or journals, searching online. The members of four communities were asked for an estimate of the time that should be devoted overall for development activities such as formal training, informal learning, reading, and searching online. They estimated that they *should* be spending about 12-14% of their time, which shows that they clearly recognize the value of learning and development as part of their work. Finally, among all the communities, the three most commonly preferred modalities for learning were classroom training (84%), e-Learning (75%), on-the-job training (72%).

Both the BM and DA communities have distinctive work settings and tasks that seem to clearly affect their learning practices and preferred modalities. Compared with the learning practices and preferences of the rest of the communities, the BM community stands out for devoting much less time to learning activities (4 days per year, 5-6 hours per month) than the others. This community performs the highly demanding job of putting together large bid proposals where large amounts of information are to be managed in a short amount of time and within bursts of synchronous collaboration with multiple parties. As a result, very little time is available for training. When asked about their learning preferences, they differ from most of the other communities in that they prefer more On-The-Job Training and less e-Learning. The members of the DA community, which has the lowest connectivity and a high degree of on-site work, agree in their preference for more On-The-Job Training and less e-Learning and web sessions, likely due to the greater amount of physical constraints and mobility in their work setting. These are important parameters to consider when designing programs and tools for a learning community.

Programs and Tools (Intervention)

After analyzing the surveys, the organizers identified needs and customized a set of programs and tools for each of the nine communities, which correspond to distinct job functions in DocServices. Each community was designed and launched with the support of an *advisory council*: this was a core group of about 4-8 motivated professionals who took on the role of facilitators and co-leaders who would “jump-start” and maintain activity in the community (see governance committees in Probst and Brozillo 2008). Once formed, the council would manage meetings, agendas, invitations, topics and edits to the community tools (i.e., wiki or Expert Network). The programs and tools were first handed to the members of the advisory council, who helped to customize them for the needs of the community, and then were made available to other prospective community members within DocServices. For example, the content of the Expert Network tool (i.e., specific areas and experts per areas) was first initialized by the council, leveraging information from the pre-survey. It was later made open for contributions from the rest of the community.

The *tools and programs* are listed in Table 1 (rightmost column). Regarding the tools, all of the communities use the Wiki for sharing information and for coordinating activities in addition to using the corporate email (MS Outlook). Five out of the nine communities (BM, PMP, PM, DA, DC, EP) have access to the Expert Network tool, which allows the members to find experts within the community for specific subject areas. The development programs consisted of social engineering initiatives

designed to respond to the specific needs of the members as the community is formed. For example, an On-Boarding program was introduced in the GPE community because several newly hired workers needed to be integrated into the community. Programs that helped to acquire official professional certifications were introduced into the AP and PM communities.

EVALUATING COMMUNITY DEPLOYMENTS (EFFECTS)

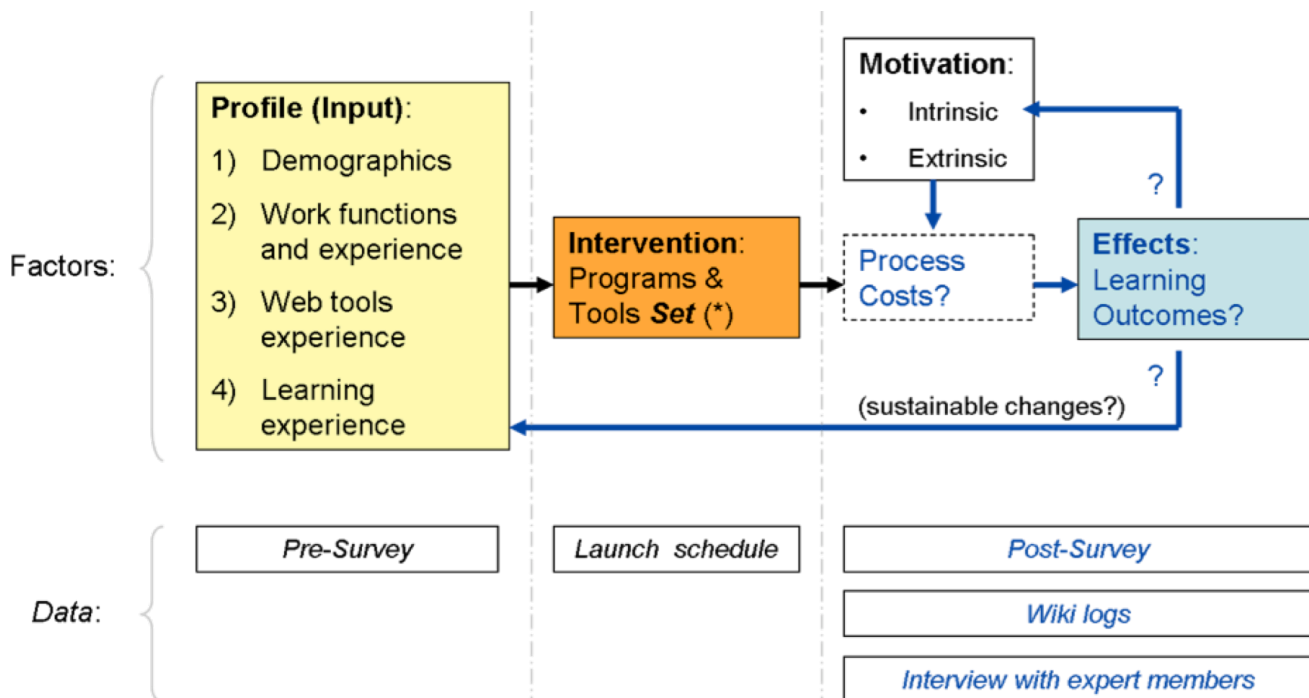
Figure 1 depicts our overall research approach. Our on-going work is to evaluate the *effects* of tools and programs implemented (or Interventions) in each community (i.e., to what extent these were successful), while taking into consideration the community profile (or Input factors). Below we present some preliminary findings.

From our first phase of research (10/2008 – 04/2009), we present data about nine online learning communities, summarizing how these communities were launched and how they are being supported.

A second phase of research has followed (04/2009-present). In this phase, we are collecting general data about the effects of current tools and programs implemented in all the communities. The data types include wiki logs, a follow-up survey administered in each community after one full year from the launch, and qualitative data collected via bi-weekly meetings with the organizers. In addition, we are also conducting more in-depth investigations of specific communities.

Two Case Studies

Two cases of communities that we have studied in greater



(*) The model may be slightly different across communities

Figure 1. Conceptual Model.

detail are Alliance Professionals (APs) and Bid Managers (BMs). These were informative cases because of the demanding, high-revenue-generating jobs of the participants and the interesting differences and similarities between the two communities. Overall, the BM community is smaller, more co-located, and the workers appear to have a slightly more structured work process than the APs. However, the job functions of BMs and APs have numerous similarities, such as the demanding condition of managing multiple projects, which suggest similar needs).

For each case, we analyzed data from the community Wiki logs, a follow-up survey, and a 2-round interview with a few active members of each community. In the first round of interviews (roughly 50-60 mins), we characterized the professionals' primary job functions, identified key work tools and collaborators, and gained an in-depth understanding of participants' typical project workflow, including the processes, tools, people, and timeframe involved at various stages. Following the first round interviews, we sent them a two-page summary with a sketch of the workflow and notes from the interview. A brief follow-up phone call or email exchange was used to validate the summary and make required corrections.

This second phase of research is aimed at informing the development of enhanced community-supporting tools and programs. The second round of interviews (50-60 mins) is specifically used to analyze requirements for such tools. We will design better knowledge-sharing tools with participation from community members and will test and deploy them in a few selected communities. We provide below the main findings collected from the two case studies.

Alliance Professionals (APs)

We surveyed 13 (64%) of the APs. Primarily senior employees, they had an average of 10 years of experience in the current job (range: 1-25, SD=8), an overall average

corporate age of about 16 years (SD = 7.8), of which about 10 in the current company, and high self-ratings of levels of expertise (4.4, 1-5 scale). Four alliance professionals were invited to participate in two rounds of in-depth interviews. The data collected revealed some common themes about the tools, tasks, workflow, as well as some feedback on tools and programs. (See Figure 2.)

Tools. Email is a primary communication tool for the professionals (100% use at least several times an hour), as well as the phone (70% reported using a landline and 85% reported using a cell phone at least several times per day). Document, spreadsheet, and slide deck editors are the key production tools, and personal file folder systems are used for archiving information. Instant Messaging and text messaging (SMS) are used less frequently (roughly 62% use IM daily and 31% use SMS daily); similarly web-based tools for sharing such as wikis and content management systems (i.e. DocuShare) were not accessed as often. They expressed dissatisfaction with the current tools, given the lack of integration across them and the high interaction costs for using them.

Tasks. The tasks for APs center on creating and managing business alliances with large IT industry partners (e.g., IBM, TCS, Dell). This work involves identifying opportunities with an alliance partner, formulating a value proposition with various stakeholders (such as the executives of a partner company), and ultimately generating an operational business plan (documents, spreadsheets, and slide decks). The process of forming a new alliance requires at least a few months to as much as a year. The stakeholders involved in the projects are typically distributed geographically: we surveyed and interviewed professionals in the USA and UK, who collaborate with business contacts across various countries or continents. About 30-40% of their working time is spent traveling, working at a client site, or working from home. Different subgroups of

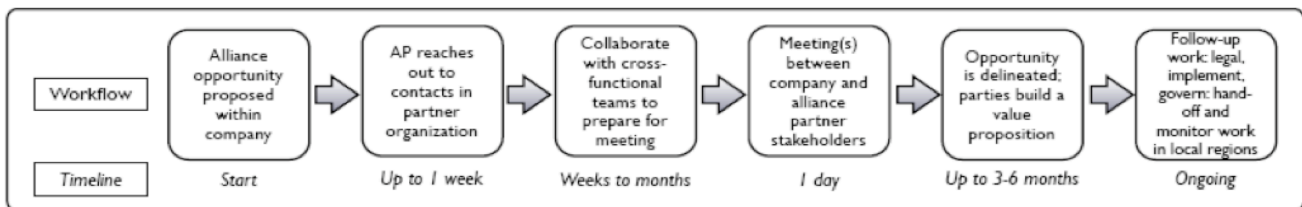


Figure 2. Alliance Professional Workflow.

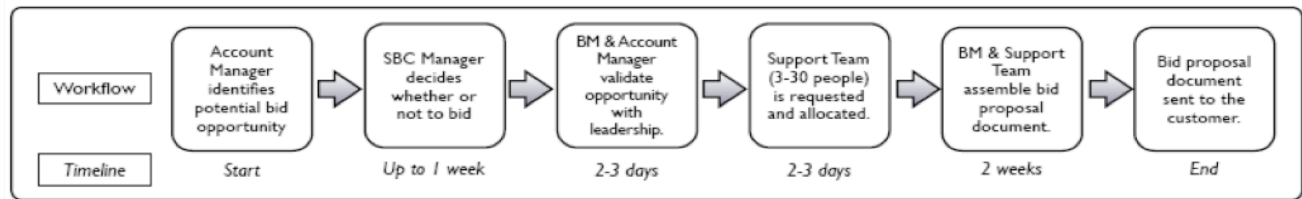


Figure 3. Bid Manager Workflow.

professionals collaborate at different stages of the workflow as they work towards goal completion. For example, after first establishing the overall plan with a large team of top executives through workshops (5-20 people), the AP handles the operational aspects of deploying the plan with teams of regional managers from the involved companies (5-10 people). Figure 2 illustrates the steps and a timeline for a typical project.

Feedback on tools (i.e., wiki) and programs. The members of the AP community clearly recognized the value of the programs and tools implemented for their community. On average, they estimated that about 15% of their time should be spent on the learning & development activities, such as using the community wiki (which should be improved), the communities of Practice meetings, and certification courses. The main issues they reported having with the community wiki were: access and visibility of the wiki; cost in editing and formatting (e.g., support for drag and drop of content); the need for appealing, relevant, and up-to-date content (e.g., RSS feeds, podcasts, useful document templates); and powerful search and categorization capabilities.

Bid Managers (BMs)

We surveyed 10 (50%) of the BMs. This community operates in Europe and has its headquarters in the United Kingdom. They worked, on average, about 7 years at DocServices (range: 1-25, SD=7.4) and, overall, about 15 years in corporations. Given the expert nature of the job role, members who have joined more recently have already worked in other companies doing similar jobs. They gave high self-ratings of levels of expertise (4.6, 1-5 scale). Four BMs were invited to participate in two rounds of in-depth interviews. We summarize below initial findings from interviews and a prior field study of this community (Tolmie, 2009).

Tools: As with the APs, email and phone were primary communication tools (100% used email at least several times an hour, and 100% used a cell phone at least daily). They used document, spreadsheet, and slide deck editors to build proposals, and when possible preferred to work face-to-face in teams to define the proposal and work on specific sections. IM was used as frequently as the AP's (67% use daily), but SMS is used very infrequently for work purposes (17% used daily). They share content via email and a web-based content management system (83% used at least daily). A shared database with search capabilities supports the use of content from prior proposals.

Tasks. The BM's main task is to identify and respond to bid opportunities with large multinational corporations for large service deals (\$10-50 millions). This work includes evaluating potential bid opportunities, building a support team to respond to an opportunity, and ultimately assembling a bid proposal document. The process ranges from 4 to 6 weeks to several months depending on the size of the deal. The workflow brings together different subgroups of professionals at different points in the process.

A typical engagement will involve collaborating with commercial teams, subject matter experts, legal and contract advisors, and others depending on needs. Typically, this work involves collaborating with ad-hoc teams (5 – 30 people). Figure 3 illustrates steps and a timeline for a bid management project.

Feedback on tools (wiki) and programs. Compared to the other communities, the BMs indicated spending significantly less time on formal learning and a clear preference for on-the-job training. Their work is, in fact, information-intensive and their time is very limited (as we experienced while scheduling the interviews). Moreover, in this community, in order to make the workflow more efficient, a knowledge manager is formally in charge of maintaining the knowledge sharing tools such as the wiki, the expert network, the content management system, and the shared database. This characteristic is not shared by any of the other communities.

ONGOING WORK

While interviewing members of the two communities studied in detail (APs and BMs), we identified a number of needs for knowledge-sharing support. In particular, we identified two specific areas where web-based technologies could provide support. The first area was the high interaction cost of current information-sharing tools; the work of both groups was revealed to be highly time and information-intensive so resources for overcoming technological barriers to information-sharing were limited. The second area concerned the growing number of information channels (email, phone, IM, CMS, etc.) and the increasing difficulty of maintaining awareness of information across those channels.

In order to address these needs, we have developed two information-management tools. The first tool is the Mail2Tag (Nelson, et al. 2010) email-tagging system to aid in *lowering the cost of information-sharing* by minimizing formatting costs and integrating sharing activities into existing tools. The second such tool is the FeedWinnower cross-channel aggregator (Hong et al. 2010, Convertino et al., In review), which is designed to aid in *lowering the fragmentation of information across multiple channels*.

Mail2Tag: Information-Sharing Through Email

Our interviews with the professionals revealed two factors which they identified as significantly increasing the cost of information-sharing: 1) current web-based tools lack integration with the core work tools used daily, and 2) interaction costs associated with formatting, organizing, and maintaining information are too high. To address these needs, we have developed an "email-tagging" tool which allows users to share bits of information in a manner that is integrated with a core work tool (email) and that doesn't require additional formatting or organization work. Community members receive shared documents in the form of digests to which they can subscribe at a frequency that can be customized. In addition, shared documents are

aggregated in a searchable Web interface, which allows for low-cost integration with other tools such as wikis.

The Mail2Tag system is currently being piloted with a group of 18-20 professionals from the PMP community engaged in a leadership program. The system has been introduced into the community with pre-loaded content and activity has been motivated through a game-like program to encourage participation. The pilot program will last 6 months with ongoing support throughout; at the end of this period, we will conduct a post-survey and interviews with the community members to assess the utility and usability of the system.

FeedWinnower: Cross-Channel Information Aggregator

In our interviews with the professionals, members of both groups also expressed significant difficulties with managing the flow of information along multiple channels. Using the two rounds of interviews described above, we elicited key needs for an information management tool and had the professionals evaluate two paper prototypes for such a system. In a third interview, we had 4 APs and 4 BMs test out a software prototype entitled “FeedWinnower” that addressed these needs by aggregating information such as content from emails, documents, and CMS with status updates into a single system. 4 ‘facets’ (creator, source, topic, and time) allowed users to quickly ‘slice and dice’ information to get at ‘hidden gems’ (see Hong et al., 2010 for more details on software prototype).

Participants from the two communities evaluated that such a tool would be helpful in initial information-gathering and final information-organization steps of their respective workflows, and gave feedback regarding additional functions which could be added to the tool to better support their work. We are currently in the process of evaluating the prototype with seven senior managers from a mid-sized research organization in order to evaluate the generalizability of these results and the suitability of this tool for supporting the work of similar professionals. In the future, we hope to evaluate working version of the system with the professionals from the two communities (see also Convertino et al., 2009, Convertino et al., in review).

CONCLUSION

Research about online communities within organizations is still insufficient to determine how communities of practice can be built to most successfully support learning and development. We seek to understand the specific conditions and interventions which will allow these communities of practice to thrive. Our cases studies suggest that in order to be successful the design of social and technological interventions needs to be properly adjusted to match the natural work practices in place before the launch of the community.

A number of qualitative observations from our intra-organization communities, combined with consistent findings from prior success cases of online communities, suggest that the design of community-building interventions

(i.e., web tools and development programs) are likely to be sustainable when led by an *indirect design approach*. That is, when the tools and the programs help directly with the daily work of individuals and their task forces (rather than being an additional burden for them) and at the same time enable *as a side effect* the new opportunity for individuals to easily contribute to community resources while carrying out daily work (e.g., wiki pages, shared bookmarks, shared annotations). Inspired by this approach, our strategy to design better support for our learning communities starts from the identification of key needs of the individual professionals and their task forces. We believe that by adequately addressing these needs we can create specific conditions that promote the emergence of communities.

Overall, the members of the two communities investigated in detail had consistent views about some basic needs that technology can address to better support their work. Two key problems that the services professionals face regularly are handling (a) a large amount of information which they need to monitor or process daily and (b) many information channels which they need to coordinate (email, phone, DocuShare, wikis). These channels currently act independently from one another, resulting in an extra cost for the users. Support for learning and development, such as the technology introduced, should help them address, at least in part, these two challenges.

In our study, information overload was, in fact, recognized as an acute problem for professionals performing complex collaborative tasks in an enterprise. The Information Overload Research Group (iorgforum.org), which includes companies such as Microsoft, Google, IBM, and Intel, was recently formed to look into this issue. Information overload is a common threat to the productivity of knowledge workers required to keep track of information across multiple channels and locations (e.g., phone, email, corporate wikis, internal and external web sites). This problem was visible in the cases studies reported above.

Addressing the problem of overload due to the amount of information and number of channels is relevant to managers because it helps them to increase the efficiency of the organization. It is of relevance to the workers as well because it helps them to develop professionally and to cope better with the complex and non-routine nature of their particular form of knowledge work.

In summary, we have been studying services professionals whose typical job is managing or contributing to ad hoc task forces. We are characterizing in detail the work of these task forces and analyzing specific requirements. Our preliminary findings provided us with a glimpse into how technological interventions might allow these professionals to better manage information and work processes and, in the long term, might better support their learning communities.

Ongoing work includes the testing of two tools to support information sharing and management. The first of these is

Mail2Tag, which is designed to lower the cost of information sharing via email (Nelson et al., 2010). A new implementation of this tool is currently being prototyped and evaluated with a group of 19 professionals from a new community. In parallel, we are prototyping and evaluating with APs and BMs a tool called FeedWinnower, which is a cross-channel aggregator designed to lower difficulties relating from managing information across multiple channels. We argue that by directly addressing the information sharing and information management needs of the professionals, these two tools can more effectively promote participation and new intelligence at the level of their learning communities.

In the future we will continue the study of the communities within DocServices by assessing the intervention and eliciting requirements for improved technology. We will continue prototyping and evaluating new tools that can promote low-cost sharing, aggregation, and re-use of knowledge.

We hope that the findings and the research prototypes generated in this research will inform future deployments of learning communities in similar organizations.

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