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### The communicative ecology of Web 2.0 at work Social networking in the workspace

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#### Published in:

Journal of the Association for Information Science and Technology

Published: 01/10/2014

#### Document Version:

Post-print, also known as Accepted Author Manuscript, Peer-reviewed or Author Final version

#### Publication record in CityU Scholars:

[Go to record](#)

#### Published version (DOI):

[10.1002/asi.23112](https://doi.org/10.1002/asi.23112)

#### Publication details:

Davison, R. M., Ou, C. X. J., Martinsons, M. G., Zhao, A. Y., & Du, R. (2014). The communicative ecology of Web 2.0 at work: Social networking in the workspace. *Journal of the Association for Information Science and Technology*, 65(10), 2035-2047. <https://doi.org/10.1002/asi.23112>

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## The Communicative Ecology of Web 2.0 @ Work: Social Networking in the Workspace

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### Abstract

Social media have transformed social interactions and now look set to transform workplace communications. In this exploratory study, we investigate how employees use and get value from a variety of social networking technologies. The context of this research is four software firms located in China. Notwithstanding differences in corporate attitudes towards social networking, we identify common themes in the way Web 2.0 technologies are leveraged as value is created by employees at all levels. We draw on the communication ecology framework to analyse the application of various technologies. We inductively develop five propositions that describe how social networking technologies contribute directly to horizontal and vertical communication in organizations, and ultimately to individual, team and organizational performance. Implications for research and practice are discussed.

### Introduction

The Web 2.0 revolution has taken online relationships by storm, with a wide variety of applications offering interlocutors a myriad of communication opportunities. Communication has now been liberated “from the confinement of time and space” (Chang & Ian, 2012). McLuhan’s (1964, p.248) hyperbolic remark that “the simultaneity of electronic communication ... makes each of us present and accessible to every other person in the world” has ironically never been more true. As McLuhan (ibid.) recognised, this is a global phenomenon, yet the extent to which these same social computing applications are accepted as supporting work is a matter of controversy (Isaacs, Walendowski, Whittaker, Schiano & Kamm, 2002). While some accept the legitimacy of Web 2.0 applications in the workplace (e.g. Davison, Ou & Martinsons, 2013; Lee, Watson-Manheim, Chudoba & Lee, 2013; McKinsey, 2009, 2013), others are more sceptical, since these interactive applications are more normally associated with social functions such as chatting (Nardi et al., 2000; Chui, Miller & Roberts, 2009).

Recent evidence (e.g., Ou & Davison, 2011) suggests that by strengthening social networks in the workspace, Web 2.0 applications have the potential to enhance coordination and collaboration, knowledge sharing and problem solving. McKinsey (2009, 2013) found most companies in their global surveys to be satisfied with the use of Web 2.0 in their business. Nevertheless, a third of respondents reported that they had either not yet achieved business benefits, or not yet learned how to measure these benefits, or not yet utilized Web2.0 at all. Interestingly, McKinsey (2009) also suggested that while 41% of Chinese respondents reported that their organizations are utilizing Web 2.0 for work with *external* partners and suppliers, only 54% indicated that they use Web 2.0 for *internal* purposes, the lowest score among all countries studied.

In this paper, we undertake an exploratory investigation into the use of Web 2.0 applications in professional service firms. The cultural context of our research is China, where online social relationships have become ubiquitous (Davison et al., 2013), even as popular Western platforms such as Facebook and Twitter are blocked by censors. Despite a climate of media censorship (Yu, 2006) and an espoused culture of highly controlled corporate governance (Bai, Liu, Lu, Song & Zhang, 2004), Web 2.0 applications are increasingly frequently encountered in Chinese organizations (Davison et al., 2013). Although McKinsey’s global surveys provide some insights into the potential benefits that companies may reap from Web2.0, detailed analyses of how companies have leveraged specific Web 2.0 tools for competitive advantage are rare. This led to our

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primary research question: How do Chinese professional service firms use Web 2.0 technologies in order to create value at work?

In order to answer this question, we study and compare the experiences of four Chinese firms where Web 2.0 applications are used regularly. These firms exhibit a rich array of corporate cultures and choices of Web 2.0 applications (see Appendix). Mini-cases of the firms draw on data obtained from interviews, participant observations and corporate documents/websites. Our cross-case analysis was theoretically informed by the communicative ecology framework (CEF) (Foth & Hearn, 2007). CEF provides a scaffold for our discussions and development of a research model that encapsulates the phenomenon of Web 2.0 utilization in organizational contexts.

This paper is organized as follows. Following the introduction, we further describe the theoretical lens that we apply to the research and briefly review the literature on Web 2.0. We introduce our research methods and present our four mini-cases of Web 2.0 use in Chinese firms. Our analysis identifies common themes across the cases in order to demonstrate more and less successful examples of Web 2.0 practice and links these themes to the theoretical lens of CEF. We conclude the paper with a revised research model and an assessment of the contributions, recommendations for both research and practice and a final set of conclusions.

## Literature Review and Theoretical Framework

### The Communicative Ecology Framework (CEF)

Communicative ecology is a conceptual framework used in the domain of media and communication research to represent and analyze the relationships among social groups, interaction and communication media. The concept of communicative ecology can be traced back to McLuhan's (1962) research on media ecology, which demonstrates that new media and technology can influence communicative content, and also highlights the symbolic interactionist perspective of communication as embedded in context (Barnlund, 1979). Based on these works, Altheide (1994, 1995) further developed the concept of an "ecology of communication" in order to examine the mutually influential relationships between information technology, communication formats and social activities, within the context of people's social and physical environments. Recently, Foth & Hearn (2007, p.9) formally defined the term 'communicative ecology' as "the context in which communication processes occur". The CEF contains three layers: technological, social and discursive.

The *technological layer* describes the communication media and technologies used for interaction, covering traditional media such as telephone networks, face-to-face modes and also new media such as instant messaging and social networking. The *social layer* consists of people and the social structures that connect them, ranging from individuals and groups of friends to managers and employees in formal organizations. The *discursive layer* refers to the content of communication. It is important to note that these three layers are intricately interwoven and mutually constitutive (Foth & Hearn, 2007). In the context of communicative ecology, multiple media are often used because it is beneficial for individual interlocutors to take advantage of different tools in different situations (cf. Dennis, Fuller & Valacich, 2008). Therefore, communication is described as "processes that involve a mix of media, organized in specific ways, through which people connect with their social networks" (Tacchi, Slater & Hearn, 2003: 17).

The triple-layered nature of the CEF provides a sophisticated theoretical lens to investigate not only the phenomena associated with the media preferences of individuals, groups and organizations, but also the interplay between these preferences and associated relationships, as well as the changes in communication content that occur within these relationships. For example, Button & Partridge (2007) adopted the CEF in their analysis of the similarities and differences between twelve diverse neighbourhood websites in terms of their social, discursive and technological features. More recently, Smith, Nguyen, Lai, Leshed & Baumer (2012) suggested that new university students rely on a constellation of technologies to communicate with their parents, consistent with what has been described as a communicative ecology.

Focusing on the recent application of new media in corporate communications, Hearn, Foth & Gray (2009) employed the CEF to explore mobile media, Web 2.0, Blogs, Wikis, Virtual Worlds (e.g., SecondLife), Digital Storytelling Communities and Chat in organizations from the technological, social and discursive perspectives. In parallel with this conceptual work in the communications discipline, a related stream of empirical work in the information systems (IS) discipline has investigated the use of Web 2.0, as reviewed in the following sub-section.

### Web 2.0 Applications in Organizations

Organizational communication has changed dramatically with the advent and spread of computer-mediated communication (CMC) technologies: the Internet and CMC have co-evolved in response to technological innovations and customer demands. The emergence of Web 2.0 applications in particular has enabled users to interact and collaborate in a virtual community. Virtual communities tend to expand beyond firm boundaries so as to include both customers and other external stakeholders (Bell, Lai and Li, 2012). Both the use and impact of

Web 2.0 applications have increased dramatically over time (Turner, Qvarfordt, Biehl, Golovchinsky & Back, 2010). User-generated content is now a key characteristic of Web 2.0, with applications including self-publishing, editing, sharing and commenting on content (Boulos & Wheeler, 2007).

Existing Web 2.0 research can be grouped into several categories. The first type of study emphasizes how a new medium is adopted and used. For example, Java, Song, Finin & Tseng (2006) identified several categories of intention to use Twitter, including daily chatter, sharing information or URLs, reporting news, and conversation. The second type of study emphasizes the specific aspects of media use, such as motivations or barriers. Wagner & Majchrzak (2007) studied the customer-centricity of wikis and presented six characteristics that affect customer engagement. Allowing multiple layers of participation to emerge and be maintained in a wiki leads to more constructive customer engagement. The third type of study focuses on Web 2.0 applications in such contexts as: social activism, e.g. anti-government protests; political campaigns (Cetina, 2009); crisis communications and disaster response (Acar & Muraki, 2011, Qu, Huang, Zhang & Zhang, 2011; Li & Rao, 2010); and education (Ebner, Kickmeier-Rust & Holzinger, 2008). A related but distinct fourth type of study has examined Web 2.0 applications as an organizational tool for facilitating and managing communication and collaboration. Many of these activities occur within the boundaries of a single organization. However, some cut across those boundaries, such as marketing communications and inter-organizational collaboration on new product development (Davison et al., 2013). We now look in more detail at specific Web 2.0 applications, as well as at corporate concerns related to them.

### ***Microblogging***

Microblogging applications, such as Twitter, Yammer and Weibo, enable users to exchange micro-quantities of content, typically up to 140 alphabetical letters or pictographic characters. These can include text, images and links to external sites. Microblogging has been found to improve the speed and quality of communications while increasing transparency and accountability (Günther, Krasnova, Riehle & Schöndienst, 2009; Li & Rao, 2010).

Microblogging is not restricted to social contexts. Both internal and external collaboration, relationship marketing and knowledge sharing are popular business applications of microblogs. For instance, Twitter has been used in organizations to share business information and personal updates with colleagues in real time, and as “personal RSS feeds” to monitor trusted external sources for news and links (Zhao & Rosson, 2009). Corporate microblogging applications, such as Yammer, have supported awareness creation and team/task coordination (Riemer, Richter & Seltikas, 2010) and facilitated e-marketing by increasing brand awareness and highlighting other marketing goals (Jansen, Zhang, Sobel, & Chowdury, 2009). Microblogging facilitates electronic word-of-mouth (eWoM) behaviour by consumers who can share their opinions concerning brands. Given these precedents, microblogging is a viable medium for improving brand awareness and brand image, managing customer relationships, collecting customer feedback and influencing eWoM practices.

Key issues and concerns associated with the adoption of microblogging at work relate to privacy, communication benefits, signal-to-noise ratios and codification effort. Each of these has been independently demonstrated to influence adoption success (Günther, Krasnova, Riehle & Schöndienst, 2009).

In China, research into the organizational applications of microblogging is very limited. Zhang (2011) explores the application of Sina Weibo to viral marketing, drawing on a case study of Vancl, a B2C retailer, while Li, Cao, Jiang, Li, & Yao (2011) explore 22 official brand microblogs in an investigation of their commercial potential. The world’s most popular microblogging service, Sina Weibo, constitutes a virtual public space. It had 380 million users at the end of 2012, with about 100 million messages posted daily (Wikipedia, 2013).

### ***Instant Messengers (IM)***

IM applications, such as MSN Messenger, Windows Live Messenger, G-Talk, QQ, Real Time eXchange (RTX) and WangWang are designed to enable (near-) instantaneous text-based communication between interacting parties. More advanced IM applications such as Skype offer voice and video, hyperlinks to other media, and file sharing. Web-based IM applications, are now almost ubiquitous in organizations, often replacing email altogether between some groups of employees. IM applications typically operate over the public Internet, but they can be configured to run off internal corporate servers with enhanced data security.

IM applications have been extensively researched in the Western literature. They are often used to compensate for the lack of face-to-face interaction in situations such as “quick questions and clarifications, coordination and scheduling, to discussions of complex work” (Avraami & Hudson, 2006, p.505), as well as emerging issues (McKinsey, 2009). They thus provide a complementary communication channel in the workplace, especially when employees are distributed. IM applications are widely used by people who need to maintain real-time contact with colleagues, no matter where they are located. Most IM users indicate their online availability, which means that they are open to contact and interruption (Garrett & Danziger, 2007). A core theme in IM research relates to the negative impacts associated with work interruption (Nardi, Whittaker & Bradner, 2000).

The use and impact of IM applications in the workplace in China have been investigated by Ou, Davison, Zhong & Liang (2010). QQ is an application of particular interest because it is used by over 800 million people (Wikipedia, 2013). As in the Western context, IM use was found to increase work interruption and disturbance. Paradoxically, it simultaneously led to improvements in communication quality and levels of trust between colleagues, which in turn enhanced group outcomes (Ou & Davison, 2011). The explanation of the paradox is that work itself is accompanied by continuous interruption; interruption is normal and not particularly disturbing. Chang & Ian (2012) also focused on IM interruption at work. In the work place, IM can provide a channel for information sharing, instant connection and other new forms of collaboration. Thus, even though there are interruptions, the use of IM at work enhances personal awareness, interpersonal connectedness and the opportunity for knowledge sharing (Ou et al., 2010; Davison et al., 2013).

### ***Wikis***

Wikis are conversational technologies, which facilitate knowledge management processes from knowledge creation and storage to knowledge use and refinement (Wagner, 2004, Wagner & Bolloju, 2005). As conversational technologies, they also provide “a credible alternative to business communication technologies” (Wagner and Schroeder, 2010). Standing & Kiniti (2011) explore how wikis can be used in different stages of innovation. They suggest that wikis need to be adopted and used within a structured environment that provides both a strategic and a top down framework. Majchrzak et al. (2006) identified three primary types of benefits from the use of corporate wikis: enhanced reputation, facilitated work, and helping the organization to improve its processes. These benefits were more likely to occur when the wiki was used for tasks requiring novel solutions and the information posted was from credible sources. Meloche, Hasan, Willis, Pfaff & Qi (2009) investigated employee attitudes in contributing to corporate wikis in order to suggest interventions that might improve employee involvement. They suggested that managers should take a discretionary approach in terms of rewarding participation, productivity, quality articles and good ideas.

### ***Corporate concerns about Web 2.0***

Despite the potential that Web 2.0 technologies may bring to the work place, there are still many concerns and restrictions that may impede their implementation. Some executives fear that these applications will facilitate non-productive activities such as chatting (Nardi et al., 2000; Davison et al., 2013). Günther et al. (2009) point out that a low signal-to-noise ratio will ultimately lead to the failure of enterprise microblogging, since insufficient useful content will be shared. There is also a concern that Web 2.0 applications will prove nothing more than a passing fad (Pfaff & Hasan, 2006), though their consistent popularity over the past decade suggests that this concern is misplaced. A variety of other concerns, such as a reluctance to engage in power sharing, the risk of cyber vandalism, uncertainties over quality control and evaluation, and the absence of an appropriate organizational culture, may all lead to the still-birth, early abandonment or outright rejection of corporate wikis. The issue of organizational culture should not be overlooked. It is important that the primary purpose of establishing a corporate wiki should be embedded into the organizational culture. If there is no clear purpose, or if the wiki is not focused on a specific business issue, then a wiki initiative is most unlikely to be successful (Chui, Miller & Roberts, 2009).

## **Methods**

Given the limited prior literature about Web 2.0 use in Chinese organizations, a qualitative, case-based exploratory study was planned in order to enable the development of a better understanding of where, how and why Chinese organizations use Web 2.0 applications. We made contact with four firms in a single industry within the professional services sector: software developers. The four firms had very different management styles, but their key activities all involved substantial amounts of internal and external communication. Even though none of the firms had espoused a formal strategic position with respect to Web 2.0 applications, there was considerable commonality of purpose across these firms in the use of Web 2.0 applications.

The four firms were located in Beijing (2), Chengdu and Xi'an in China. We code-name these four firms as: Mercury, Beech, Silver and Parana. We developed a semi-structured interview protocol to guide our interviews that covered the following topic areas: which Web 2.0 applications are used and in which contexts; Why Web 2.0 applications are used in preference to other communication channels; the frequency of use; the purpose of use, e.g. negotiating, collaborating, sharing knowledge, problem solving, marketing, etc.; the impact of use on the organisation in terms of the current organisational culture and work-related protocols. In each firm, we interviewed 10-15 people ranging from senior managers to front-line staff, either individually or in small groups. Interviews lasting between 20 and 60 minutes were usually recorded (with interviewees' permission) and later transcribed. These interviews took place in March, June, July and October 2012. All interviews were conducted in Chinese, transcribed and then translated into English.

The first author and a research assistant coded the translated interview transcripts independently. Given that the CEF had been identified previously as a lens to interpret the data, we did not adhere to all the precepts

of Grounded Theory, yet nevertheless found that an axial coding approach (Strauss and Corbin, 1998) was beneficial to our disaggregation of the core themes relevant to Web 2.0 use in the workplace from the rich body of data. Some of these themes were predicted by the literature and indeed were reflected in the interview protocol. Thus, for example, there are themes related to the functional purposes of each different Web 2.0 technology. These include ‘marketing’, ‘knowledge sharing’ and ‘problem solving’. On the other hand we also identified new themes that were not predicted by the literature. These themes include new functional purposes, such as the inclination of some interviewees to engage in ‘thought leadership’ activities. Another new theme relates to what we term ‘partner medium preference’, i.e. the preference of an external interlocutor, such as a client, for communication through a specific Web 2.0 application. Although we did not formally conduct inter-rater reliability tests, the two coders conducted several iterative rounds of discussion about the themes in order to achieve a consistent result. For each theme, we also assembled a consistent body of evidence, i.e. material illustrating the theme. These themes were then shared with the second author of the paper, who reviewed them again, bearing in mind the interview data. Through these several steps, we can be reasonably certain that the themes are correctly identified.

In order to present the results of this research in a reasonably concise manner, we next present mini-cases of each of the four firms, highlighting key instances of Web 2.0 use and illustrating the material with quotations from interviews. Following these mini-cases, we next propose a research model that captures the primary research findings at a high level. The model includes five propositions, each of which is explained with material from both the literature and our inductive analysis of the interview data.

## Mini-Cases

In this section, we present brief accounts of the way in which Web 2.0 applications are used in four Chinese software firms. Software firms are a type of professional service firm that tend to have high levels of knowledge intensity, a highly professionalised workforce and low levels of capital intensity (Nordenflycht, 2010). Knowledge workers in these firms commonly have a high degree of work autonomy, and hence are rarely directed into activities in which they have little interest (Nordenflycht, 2010). Our accounts are deliberately written as mini-cases rather than as complete case studies, in order to illustrate the breadth and depth of Web 2.0 application.

### Mercury

Mercury is a large software firm with over 17,000 employees. It is headquartered in Beijing and serves both domestic and international clients. Mercury has a restricted set of IT policies with respect to Web 2.0 applications. These policies are the remit of an IT Security Committee, chaired by an Executive Vice President. Senior people have fewer restrictions than junior employees while technology-focused employees face fewer restrictions than those in Administrative departments like Human Resources. Employees who handle sensitive data, such as financial accounts and salaries, do not have access to any Web 2.0 applications.

Although MSN used to be blocked it is now accessible by employees, some of whom use it for both internal and external communication tasks such as: knowledge sharing and collaboration; contacting former colleagues and industry experts; engaging with executive/personnel search agencies, such as when identifying new employees. On the other hand, QQ is completely forbidden for junior employees because of concerns about its poor security. However, senior managers have more discretion and may use QQ, notably for the transfer of large files, as email attachments are otherwise limited to 10MB. For instance, the Marketing Manager reported using QQ to send large files to suppliers, media contacts and PR agencies.

Weibo (microblog) is actively used by employees in the marketing and communication departments. At the time of our interview (July, 2012), the total number of followers was around 500. However, most of these were internal employees and most of the content was social. The Marketing & Communication Director indicated an interest to extend Weibo use to clients and other external parties through a short term strategic plan built around connections with fans, topics and industry channels. The VP of Marketing suggested that current employees should use Weibo to promote Mercury to their friends, who may be interested in working for the firm. Separately, a pilot trial of Yammer was underway. Some 2,000 employees were reported to use it for general purpose discussion about business issues, client problems and new products. This was seen as being popular and it was expected that it would be rolled out to other units and departments later.

The IT Manager admitted that the current IT infrastructure and enterprise architecture lag behind corporate development. This is partly due to concerns about security loopholes associated with Web 2.0 applications. The current platform supports the existing 17,000 employees, but it cannot support the projected 30,000 to 50,000 that are expected in the near future. Even though there is no formal corporate position with respect to Web 2.0, there is an intention to develop an internal platform for social networking by 2015. This platform would include a video-sharing hub that could be used to push information to employees.

## Beech

Beech is a medium sized software firm with around 3,000 employees. It is headquartered in Beijing and primarily serves the domestic market. Compared with Mercury, Beech has a more relaxed attitude towards Web 2.0 applications. Only a few social networking platforms, like Kaixin and RenRen (similar to Facebook), and the video-sharing site Youku (similar to YouTube), are blocked. Wikis, IMs and Microblogs are all used actively. Employees reported using Web 2.0 applications primarily for functional and shallow communication, since they prefer face-to-face interaction for more serious discussion. However, the variety of Web 2.0 communication tools is appreciated.

Beech operates a wiki called Xin Gan Xian (XGX). As a Product Manager explained: “XGX is a platform that has been online since 2007, and provides a variety of services to external clients (such as after sales service, online updates, e-marketing, and discussion forums)”. Clients are encouraged to join this wiki, to contact and share with each other, and so to build up a knowledge sharing culture that will help both them and Beech as a whole. A separate internal wiki for knowledge sharing and problem solving has been developed, but is used infrequently. Employees reported that there are simply too many applications to use. There is no management policy that demands usage of any particular application.

IM applications are widely used internally by Beech employees. Beech maintains an internal IM platform, where each employee has an account. The manager of the Research Centre told us: “This internal IM is often used to find phone numbers, check status information, communicate privately in situations where the telephone is not suitable, and solve problems. Normally we don't use it to support group discussion”. Employees also access public IM applications like QQ, which is particularly useful when communicating with external contacts such as clients, engaging in group discussions and transferring files. Many clients prefer to use QQ, so there is strong corporate support for QQ use by employees. Indeed, as an Internet Business Unit Manager noted “Beech respects clients’ usage habits and patterns with respect to technologies like Web 2.0”.

Most employees use Weibo as a social media tool within the company, e.g. in relation to corporate events. Only one interviewee, an employee in the Research Centre, mentioned use of Weibo to follow industry leaders. Its use for digital-marketing is a new development. Seven product lines had official Weibo accounts. A Product Manager reported that employees are encouraged to follow these Weibo accounts so as to keep in touch with the positioning of products in the marketplace. However, the impact of this Weibo initiative on product awareness or sales had yet to be evaluated.

## Silver

Silver is a medium-sized software firm with over 800 employees. It is headquartered in Chengdu and primarily serves state-owned clients with social insurance applications in the hospital and military sectors. Most work is undertaken on long term contracts, which means that there is little need to contact new clients. The organizational culture at Silver is the most relaxed of the software companies. Any IT application can be used at any time, yet in practice only 1 or 2 applications are used with any regularity. From an IT policy perspective, Web 2.0 applications not considered to be any different to other IT applications. However, there are strict rules about not discussing corporate information outside the firm.

An internal wiki for knowledge sharing exists, but it is controlled tightly and used infrequently. An R&D employee claimed: “We do write experience-based articles for the wiki, but these must be vetted by our managers and cannot be commented by others”. The HR Department uses the wiki to disseminate corporate and government policy information to employees. It thus acts as a static document repository, rather than being used for dynamic discussions. Weibo is scarcely used by anyone except for social purposes. However, a Sales employee said: “we would like to develop more new, non-state-sector clients, and envisage using Weibo for digital marketing in that context”.

The most popular Web 2.0 platform in use is an internal platform called RTX (Real Time eXchange). RTX was developed by TenCent (who also developed QQ) and is designed to provide a wide range of Web 2.0 functions. Employees in the Engineering Centre explained that “...apart from an IM (which can be used to contact internal employees and external clients), RTX also keeps details of experts in specific topic areas, telephone numbers, email addresses. RTX has better archiving functions than typical IM applications”. It can thus serve as a form of corporate memory, and also enable asynchronous work. Silver does not permit the use of pseudonyms in RTX. When a user is logged in to RTX, his/her online status is visible to all others who are online. RTX facilitates communications between the Chengdu headquarters, Silver Sales teams located throughout China, and employees who are physically located in client offices. This leaves little need to use QQ, except: to contact ‘friends’ who are not on the RTX network; to make large file transfers; to access corporate information when on the move. QQ and email can be accessed through cell phones, but RTX cannot. This is seen as a significant limitation by Sales people who need to travel regularly to branch sales offices and client sites. The Human Resource team is an active user of QQ because they participate in an external HR group (200 members) in Chengdu and RTX does not support such interactions with outsiders.



## Parana

Parana is a global software company. Around 80 of its 300 China-based employees work in the Xi'an office. Parana has a generally open and relaxed attitude towards Web 2.0 and other communication technologies: anything can be used if it facilitates productivity. The primary corporate applications are Google-based, such as G-Talk, G-Mail, Google Groups, Google Apps and Docs. Skype is used extensively for remote video conferencing. MSN and QQ can be enabled if a client prefers to use these applications, but are rarely used for internal communication due to security concerns. Weibo is used at the corporate level to promote products, but not for e-marketing. Individual employees often maintain weibo accounts for thought leadership purposes, i.e. to track other industry thought leaders and to speak out as thought leaders themselves (Parsons, 2010).

Web 2.0 applications are primarily used for horizontal communication in Parana – there is very little vertical communication in this flattened organization, with the global CEO only occasionally sending emails to all employees but maintaining a blog that anyone can comment on. Each product development team maintains near constant communication with its clients via video-skype connections. Skype is left running continuously in many cases, albeit with microphones turned off, so as to create a sense of presence between the software developers and their remote clients (Short, Williams & Christie, 1976). Skype provides a strong sense of presence (Damian, Lanubile & Mallardo, 2008) to both clients and providers, who can gain video and audio access at any time.

## The Theoretical Framework

Following the CEF, we analyze our qualitative data according to the technological, organizational (social in the CEF) and discursive layers. Based on both our literature review and mini-cases, we propose that the use of Web2.0 applications such as IM, Microblogs and Wikis can enhance organizational communication and its outcomes. This process is contingent on external factors such as organizational support and a partner's media choice. Subsequently, such Web2.0-supported communication can improve individual, term and organizational performance as positive communication outcomes. We justify this Web 2.0 and organizational communication model (abbreviated as W2OC model, as shown in Figure 1) in the following section.

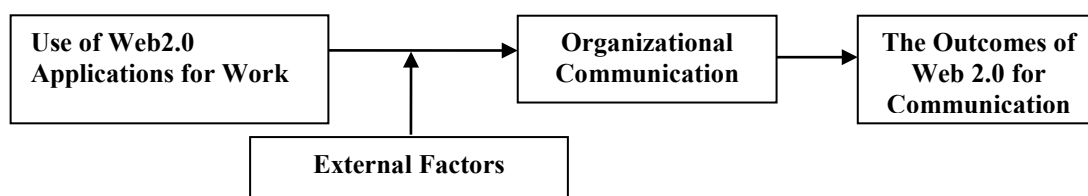


Figure 1. The Overview of Web 2.0 and Organizational Communication (W2OC) Model

## The Technological and Discursive Layers in Web2.0-Supported Communication

The technological, discursive and social layers of the CEF are dynamically interwoven (Foth & Hearn, 2007). In the four mini-cases presented above, we illustrate this interweaving through Web 2.0 applications that enable a new world of networked, interactive communication. This communication encompasses knowledge sharing, digital marketing, interactive broadcasting, and social contacts. The technology supporting Web 2.0 applications is thus instrumental in facilitating the full richness of discursive content. Unlike the pre-Web2.0 era, when most organizational communication followed a hierarchical (vertical) structure (Hearn et al., 2009), our mini-cases reveal that Web2.0 applications primarily support horizontal communication. The full proposed research model is presented in Figure 2 at the end of this section.

### *Supporting vertical communication*

Vertical communication typically occurs between people at different levels of authority, while horizontal communication occurs between people with the same level of authority (cf. Simpson, 1959). We adapt these communication norms slightly, and define *vertical communication* as top-down communication across the different levels of authority, while *horizontal communication* refers to the communication among peers, colleagues, suppliers, clients and customers in a broader sense irrespective of organizational hierarchical arrangements. Typical examples of vertical communications are senior executives involved in command/control efforts or norm creation and enforcement, internal marketing and information dissemination.

Based on our mini-cases, we argue that microblogging and IM applications in particular can help establish and strengthen corporate norms. Weibo is a powerful application with various multimedia functions that can reach both internal and external stakeholders. Using a top-down broadcasting approach, organizations like Mercury utilize Weibo to enhance the image of the company and products, publish company news, and connect different stakeholders including employees, current and potential customers, and suppliers. Weibo can

also be used for disseminating personal status information to team members. Other than Weibo, IM tools such as MSN and QQ, are also widely used for managerial control and communication purposes. They have replaced email and other more traditional applications almost entirely. IM tools usefully provide a grouping function that can connect people virtually. This is particularly valuable when managing distributed teams. Through these various channels, information can be easily disseminated to employees, who can use the same interactive applications to react or provide other information back to their managers. Thus, both Microblogging and IM applications can facilitate the fast turnover of ideas and discussion, which can contribute to the establishment and strengthening of corporate norms.

*Proposition 1: The use of Web 2.0 applications can enhance vertical communication in organizations with internal and external stakeholders, thereby establishing and strengthening corporate norms.*

### **Supporting horizontal communication**

Microblogging applications such as Weibo serve as a platform for information dissemination. Previously, companies used magazines, press releases or conferences, newspapers or television, or the services of PR consultants to manage their public relations and brand image. Companies can now use social media to engage with their current and potential customers by sharing content, insights, opinions, thought leadership positions, profiles, hyperlinks and experiences. These same customers can also interact directly with the company through Weibo and re-broadcast selected information to contacts. Microblogging tools thus help customers to acquire product knowledge and make purchase decisions, thus serving as a powerful marketing tool. For instance, Mercury uses Weibo to attract potential employees, Beech uses it to attract new clients, and Silver plans to use Weibo for digital marketing. Meanwhile, Parana actively uses blogs for thought leadership in the open source software industry.

**Weibo** is used so extensively in China that one's contacts may include both personal and work-related contacts, whether friends, colleagues, suppliers, customers or other professional acquaintances. When initiating or participating in a Weibo conversation, knowledge can be communicated and social relationships can be established among the various interlocutors. Consequently, microblogging is used increasingly by working professionals to share resources, ask questions of colleagues and peers, raise visibility of web resources, and obtain both primary news and secondary commentaries and opinions. Employees at all four firms reported relying on Weibo to follow opinion leaders in their industry. Given its interactive nature, Weibo is also useful to test concepts, exchange knowledge or opinions, and locate potential sources of knowledge and information. With the use of hashtags (#), working professionals can read all messages with a shared tag, thus getting a broader knowledge of an issue from different sources.

**Instant Messengers** can empower employees especially in their work-related horizontal communication. Ou et al. (2010) provided empirical evidence on the use of IMs to facilitate knowledge sharing and social relationships in Chinese organizations. An IM can emulate the sense of presence more commonly associated with face-to-face interactions. Pop-up message dialogue windows can stimulate an instant reaction. This bi-lateral, near-synchronous form of communication closely resembles the openness and transparency of non-mediated interactions. Instant interactions are inherently beneficial for distributed team members who work across geographical and temporal boundaries. By using IMs at work, collaborators can build up their common knowledge by quickly exchanging documents, referring to transcripts, and correcting misunderstandings as they interact. IM is thus not only an effective social networking tool, but is also useful for sharing, transferring and documenting knowledge (Cho, Trier & Kim, 2005; Li, Chau & Lo, 2005; Ou et al., 2010). We documented extensive use of IM tools for horizontal communication among peers and colleagues. MSN and QQ were both reported to be widely used for informal knowledge seeking and sharing, primarily inside the firm. The RTX platform used by Silver included intranet-based IM used for information and knowledge exchange, as well as social relationship maintenance. In Mercury, use of Skype permitted an integration of IM and video with correspondingly richer communications between clients and developers.

**Wiki** applications enable employees to create, edit, update and publish content collaboratively. Consistent with previous research (Wagner, 2004; Wagner & Bolloju, 2005), we found that wikis were critical throughout the knowledge management process in Beech, from creation, through refinement and storage, to retrieval. Beech created a formal knowledge wiki in order to manage interactions with customers who can locate relevant information about specific software products, as well as undertake simple troubleshooting searches. The wiki is maintained by a dedicated team within Beech. In Silver, a wiki was used as an internal knowledge repository, but the right of users to edit or update content was removed. Consequently, the Silver wiki became more of a static knowledge repository than an interactive discussion space, and was little used. Within the organizational environment, our data suggest that wikis may be valuable for project and design collaboration, organizing a work team around a written project via exchanging participants' knowledge in wiki. If managed appropriately, wikis can be used to create, store, update and share organizational knowledge and information.

*Proposition 2: The use of Web 2.0 applications can enhance horizontal communication for a variety of purposes related to: (1) internal communication: problem solving, knowledge exchange, social relationship; and (2) external communication: marketing, thought leadership, recruiting, brand management, after sales service.*

### **The Social Layer – Contingent Roles of Organizational and External Factors**

The social layer of the CEF considers the roles of people, communities and organizations. In corporate and work-related communication, organizational factors play a critical role. With respect to Web 2.0 applications such as Weibo and IM, it is often suggested that they are used primarily for social purposes, not work (Chui et al., 2009). Further, given security concerns, certain Web 2.0 applications are routinely blocked by organizations. Nevertheless, when management support is strong, Web 2.0 applications can be successfully adopted.

Although we found management in the four software firms to clearly be aware of the affordances and risks associated with Web 2.0 applications, we did not identify any explicit attempt to formalise how Web 2.0 applications could be exploited, though Mercury did formally block them in most cases. We suspect that the lack of a formal corporate strategy for Web 2.0, or indeed for IT more generally, is not accidental. Firstly, it permits operational flexibility – each IT application can be assessed for its merits and then exploited or not. Secondly, this flexibility means that if an IT application is found not to be appropriate, then it can be dropped easily, without damaging the credibility of a strategy and its creator. In this way, a body of knowledge about which IT applications add value can be accumulated progressively. This accumulation of knowledge is consistent with the mantra offered by China's former supreme leader, Deng Xiaoping: one should cross a river by groping for the stepping stones (摸着石头过河) (Ding and Knight, 2009). However, each of the software firms 'crosses the river' in a different way, and hence finds different IT applications to be valuable. While we did find that Web 2.0 applications are used in some firms for both vertical and horizontal communication, we also noted that corporate policies may limit use to specific people, e.g. senior managers. These policies are often premised on security concerns, i.e. the chance that malware may be accidentally introduced to the firm. An IT manager at Mercury expressed deep concerns in this respect, suggesting that QQ is notorious for virus and Trojan Horse infections, which is why QQ is restricted to a very small group of senior managers.

Mercury was the firm that operated the strictest controls over Web 2.0 applications. For junior employees, as well as those working in more sensitive functions, QQ is blocked altogether. MSN is seen as being more secure, and so its use is tolerated. Mercury is also evaluating Yammer as a microblogging tool for personal productivity. Meanwhile, both corporate management and individual managers use Weibo to communicate vertically with subordinates and team members. At Beech, Silver and Parana, corporate restrictions are less severe. All the Web 2.0 applications reviewed in this paper are permitted in each firm. However, others such as Kaixin and Renren are blocked because these are associated with social interaction, not work. Silver preferred to use an intranet-based IM tool that runs on the RTX platform and is limited to internal employees. If there is a need to contact external parties, and this is permitted, then QQ or MSN can be used. Parana made extensive use of video Skype to enable communication with distant clients. They also made use of a variety of Google applications such as Google Talk, Google + and Google Docs.

Another important influence on technology in the social layer is the 'partner's medium of choice'. Web 2.0 applications are interactive and may require the participation of third parties. Thus, the technology preferences of external parties – business partners, suppliers, customers, guests, even competitors – can influence an organization's technology choices. In accordance with institutional theory, isomorphic pressures exerted by external parties may disrupt existing organizational communication practices and so push for the adoption of new practices and tools (DiMaggio & Powell, 1983). Internal communications are less affected by these contingencies, since employees normally use a common set of tools. However, senior managers who are not Web 2.0 literate, may prefer other IT applications, like email, or traditional face-to-face communications. External communications depend more on individual choice – or indeed mandate. Thus, a client or supplier might prefer to use QQ, yet internal policies may preclude this, unless exceptions are made to accommodate the normative isomorphic pressure. In Silver, most employees used RTX for internal communications, but had to switch to other channels (such as MSN and email) for external communication, as RTX was restricted to internal employees. In both Beech and Parana, any application could be used if the client requested it, suggesting a corporate culture that was normatively attuned to the isomorphic characteristics of the environment.

*Proposition 3: The effects of Web 2.0 applications on enhancing vertical and horizontal communication are contingent on a) management support and b) the media preferences of partners, suggesting their moderating role in Web 2.0-supported communication processes.*

### **Outcomes Resulting from the Use of Web 2.0 for Communication**

#### *The outcomes of vertical communication*

Corporate norms are critical regulators of the way employees behave. Over time, these norms coalesce into an established set of working practices and the underlying values – a corporate culture. In our mini-cases, we saw evidence of these norms in various ways. In Silver, there were strict rules about not sharing information beyond the corporate boundary. Reminders about these rules, as well as other ‘instructions’ relating to government regulations, were regularly disseminated through RTX’s internal IM by the HR office of the firm. Some of these norms were formally codified into a static database, but discussion and enactment of these codified norms took place in the Web 2.0 space inhabited by all employees.

In Parana, the corporate norms were global in scope and took on a strong ethical slant. Global senior management provided clear guidance regarding the kinds of work and the kinds of clients that were acceptable. The ethical values focused on sustainability, socioeconomic justice and quality. Here, weibo was used to enable thought leadership by senior managers throughout Parana’s ecosystem, as well as beyond it. Consequently, Parana has become well known within the industry for its ethical position. When vertical communication is effective, corporate norms and culture can be easily transmitted to and assimilated by employees. This may be particularly true in organisational cultures characterised by a high power distance, i.e. where junior employees expect their seniors to communicate vertically (cf. Hofstede et al., 2010). Such vertical communication should exert a positive influence on communication outcomes, at the organizational, team and individual levels. Examples of communication outcomes include corporate performance and consistency, team satisfaction and efficacy, individual productivity and efficacy. Therefore, we propose:

*Proposition 4: The vertical communication of corporate norms will exert a positive influence on work-related processes at the corporate, team and individual levels.*

#### ***The outcomes of horizontal communication***

The horizontal communications described in this paper relate to work-related activities such as knowledge exchange, digital marketing and the establishment of work-related social relationships. Web 2.0 applications can facilitate each of these in different ways, moderated by the effects of managerial support and third-party media preferences. Knowledge exchange primarily takes place between individuals, who also establish relationships with one another. Digital marketing can occur at any level – teams can engage in marketing and individuals can encourage (e.g. through Weibo) their friends to consider applying for jobs. However, irrespective of the communication level, the effects can be felt throughout the organization. Individual and team productivity can certainly be enhanced, satisfaction can be increased, and the organization as a whole can benefit from these interactions. Akin to the Balanced Scorecard (cf. Martinsons, Davison & Tse, 1999), employee level activities cascade upwards to influence the performance of the team, which in turn cascades up to the corporate level. Thus we propose:

*Proposition 5: The engagement in such horizontal communication activities as knowledge exchange, digital marketing and social relationship building will exert a positive influence on work-related processes at the corporate, team and individual levels.*

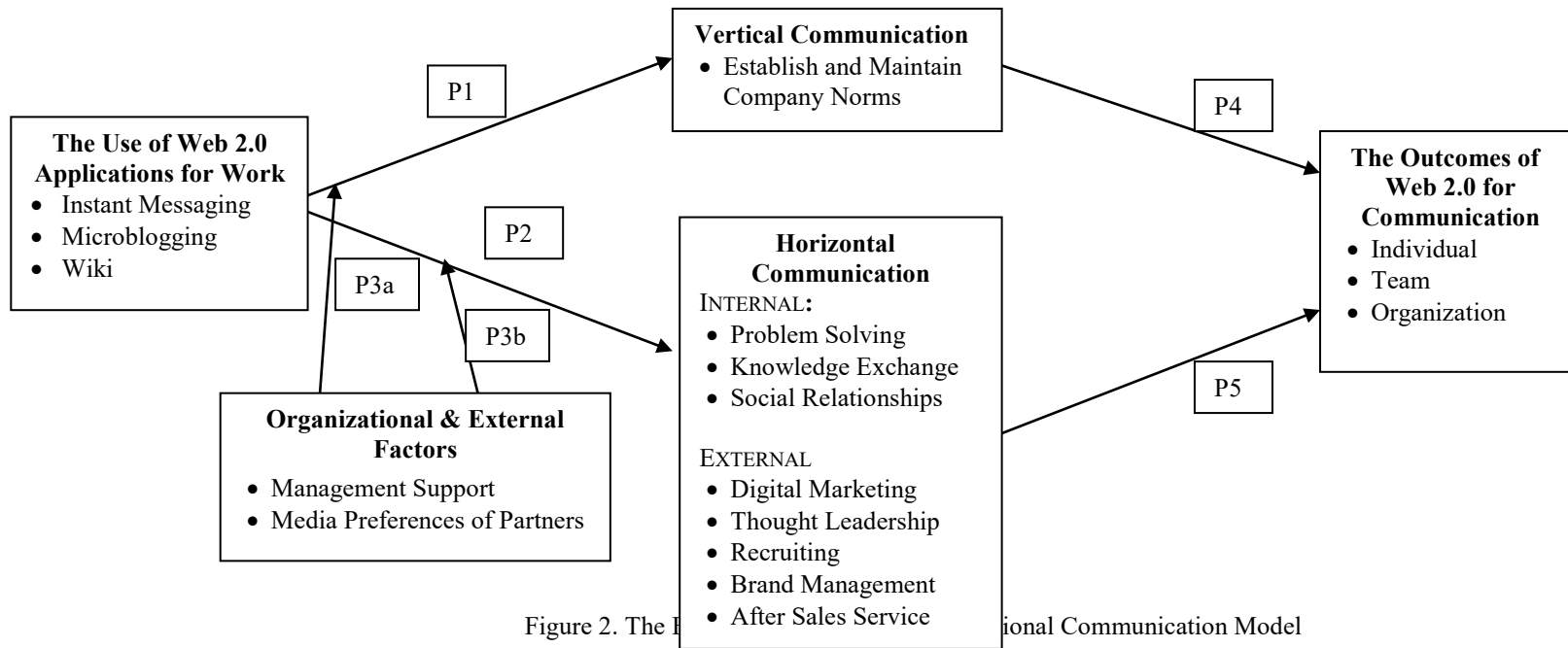


Figure 2. The Organizational Communication Model

## Discussion

The Communicative Ecology Framework (CEF) that we employed in this study has seen little previous exposure in the study of Web 2.0 networks in organizational contexts. The CEF's separation of organizational communication into technological, social and discursive layers helped us structure our investigation and analysis of Web 2.0 use in four Chinese professional service firms. From this analysis, we have developed five theoretical propositions in which we describe how Web 2.0 technologies facilitate horizontal and vertical communication processes in organizations, moderated by client media preferences and managerial support, as well as the consequent outcomes of this communication.

We observed keen interest by managers in the business value that can be created through social networking in the workplace. Our mini-cases indicate that social networking tools are commonly adapted to the work networking context. Instant messengers, wikis, blogs, microblogs and other tools are all now encountered in the workplace. However, the extent to which these tools are accepted and used varies. Managers in particular suffer tinges of apprehension given the risks associated with accidental malware introduction into the firm, as well as the broader concern that employees are liable to be distracted by the 'social chatting' aspects of Web 2.0 applications.

Management support for and championing of social media applications is critical, just as it was with earlier IS applications (Martinsons, 1993). Many Web 2.0 projects have been terminated before completion by suspicious or sceptical executives (Chui et al., 2009). Importantly, those in charge of IS budgets tend to rely on hard facts instead of personal or even crowd-sourced opinions when making key management decisions. Thus, studies to determine when, where and how Web 2.0 applications enhance productivity may help to reduce managerial scepticism and generate the required support. Senior executives are then more likely to stimulate the adoption of these IT applications by serving as role models or providing informal leadership (Martinsons, 1993). Within traditional Chinese organizations, senior managers may be expected to have a comparatively high level of fear about losing control, but are also likely to have a disproportionate amount of authority to influence IT adoption decisions.

An important moderator of the choice of which Web 2.0 technology to use, and the subsequent influences of that technology on communication is the media preference of external interlocutors. As we noted, where a client or supplier prefers to communicate via a technology that is normally not permitted, this creates isomorphic pressure to modify technology use policy. Depending on the degree of importance of the external interlocutor, the isomorphic pressure may be considered either coercive or simply normative. Coercive pressures are rarely resisted – the consequences, i.e. losing a client or supplier, would be too significant to contemplate. Normative pressures can be resisted for a time, yet an inexorable accumulation of normative isomorphic pressures, i.e. from multiple interlocutors, should convey the urgency of reviewing corporate IT policy and relaxing current restrictions. Resistance to newly introduced technologies is common. Although Web 2.0 technologies are neither ubiquitous nor universally accepted in the workplace, the extent to which they are being accepted is rising, as McKinsey has documented (2009, 2013).

Indeed, in the more liberal cultures of some of the software firms we studied, Web 2.0 technologies are already in use for both vertical and horizontal communication. They are particularly suited to horizontal communication between colleagues and peers, both inside and outside the organization. Web 2.0 may also be appropriated by senior managers (digital immigrants) who recognise their communicative power and affinity with a younger generation of employees (digital natives) for whom social networking is second nature (Wang, Myers and Sundaram, 2012). The adoption of Web 2.0 rarely raised concerns about censorship or content restrictions, but security is a major concern. It is well recognised that some Web 2.0 technologies (e.g. QQ) are inherently open to attack by malware. This can be addressed by hosting applications (e.g. RTX, Yammer) on corporate servers not the public Internet.

The use of Web 2.0 technologies in the workplace must be analysed in conjunction with non-Web 2.0 technologies, and indeed non-technology based solutions as well. In some of our mini-cases, Web 2.0 technologies have almost completely replaced other communication and collaboration tools or media. In other cases, Web 2.0 technologies are used in conjunction with email and other communication platforms. For instance, we noted a strong preference in Parana for face-to-face meetings over mediated communications. Yet when such meetings are not possible, various forms of Web 2.0 based communication, as well as email, are used comfortably. An Australian client of Parana, describing online interactions between his client team and the developer team in Xian, noted:

“We use chatroom software constantly as well as Skype. Text based chat is good for quick exchanges of information – especially technical stuff where oral chat can be ambiguous. Quite often we will switch backwards and forwards between a Skype chat with video (perhaps with screen sharing to demonstrate something) and text chat – depending on the context. If we've had a very technical chat about something where confusion may be likely, then we follow up with an email summarising the conversation to ensure that we have it right”.

This interview data, together with material in the Appendix, provides strong support for the proposed W2OC model, suggesting the interweaving of the technology, social layers and communication performance.

## **Contributions, Limitations, Future Research and Conclusions**

The primary contributions of this study come from our analysis of the Web 2.0 applications used for vertical and horizontal communication by Chinese software firms. The W2OC model (Figure 2) is grounded on both the prior literature and the data collected from our interviews and observations. It enhances the original Communicative Ecology Framework (CEF) by articulating its key components. This model, together with the associated propositions, provides the basis for both researchers and managers to analyze their current and planned IT application policies, as well as the consequent impact on both communications and organizational performance.

Nevertheless, caution should be exercised when relying on this model. Although we suggest that the model may be of universal value, its origins lie both in a broad literature and in a narrow data set, pertaining to four software firms in China. The model has not been rigorously tested with quantitative data and so the high level propositions we have derived remain to be validated formally. Future research needs to decompose the propositions into testable hypotheses that can be validated through a much larger scale data analysis, ideally across multiple industries and national cultures. Through such an extended research process, it should be possible to develop a better understanding of how Web 2.0 applications can significantly influence horizontal and vertical communication. As we suggested above, the propositions relating to vertical communication are more likely to gain traction in cultures characterised by high power distance, underlining the need to collect data in multiple cultures.

Notwithstanding these limitations, we documented a wide variety of work practices in Chinese software firms where clear and consistent advantages were conferred by the application of Web 2.0 technologies. The benefits were most obvious in situations where people are separated in space and time. We found that some employees were 'living online', having developed a near symbiotic relationship with Web 2.0 technologies. Their reliance was such that life without Web 2.0 is hard to imagine (cf. Schultze & Mason, 2012). These Web 2.0 technologies were actively embedded in many aspects of work and the workplace. However, the business benefits of social media will only be realized when they mesh with corporate policy and the organizational culture, gaining significant corporate support.

We also suggest that the dynamic interaction between Web 2.0 technologies, other Internet-based technologies and non-technological communication patterns be investigated carefully. This is not a topic that we have explored carefully in this paper, but we do see evidence to suggest that this interaction is significant. Compartmentalising analyses of different technologies is at best artificial, and at worst misleading, since in reality managers and workers use many different technologies and interaction styles. Solid recommendations for practice need to be based on the entirety of that practice, not simply a portion of it in isolation.

Our focus was on firms that can be classified as belonging to the professional services sector. Clearly many firms do not involve professional services. Even within the professional services sector, there are many different types of firms that may operate in very different ways. For instance, banks and other financial institutions may have very different communication patterns given greater concerns about security and confidentiality. These may preclude the use of certain technologies that are perceived to be less secure. We thus encourage researchers to collect more extensive evidence from a broad population of organizations in future.

In conclusion, we recommend that other researchers examine the applicability of the CEF to technology-mediated communication practices. We agree with Foth & Hearn's (2007) implicit arguments that communication practices, and the underlying technologies, constitute an ecosystem that is worthy of investigation. Thorough analysis of these ecosystems should reveal findings that are of significant value to employees at all levels in organizations, not just managers. Indeed, while we found extreme forms of Web 2.0 use, with employees engaging in multiple parallel chats on IM, we also observed more balanced behaviours, with assorted technologies being dynamically blended in support of a complex set of knowledge-based work-related goals.

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Appendix Table A1: Qualitative Data on the Use of Web 2.0 in the Observed Companies

Company Name	Web 2.0 Application	Org + External Factors		Vertical Communication	Horizontal Communication		
		Mgt. Support	Partner's Medium Use	Company Norms	Knowledge Sharing and Opinion Leadership	Digital Marketing	Social Relationship Building
Mercury	Weibo	Y	Competitor	Internal News Personal Status Updates	Opinion Leadership	Potential Employees	Y
	Yammer	Y	Technical People	Internal News	Knowledge Sharing		Y
	MSN	Y	Clients		Q&A		Y
	QQ	Y & N	Partners	QQ Groups	Q&A		Y
Beech	Weibo	Y		Personal Status Updates	Opinion Leadership	Clients	Y
	MSN	Y	Clients		Q&A		Y
	QQ	Y	Friends	QQ Groups	Q&A		Y
	Internal IM	Y			Q&A		Y
	Wiki	Y			Knowledge Repository		
Silver	Weibo	Y		Personal Status Updates	Opinion Leadership		Y
	MSN	Y			Q&A		Y
	QQ	Y		QQ Groups	Q&A		Y
	RTX	Y		RTX Groups	Q&A		Y
	Wiki	Y			Knowledge Repository		
Parana	Skype	Y	Clients		Q&A		Y
	Google Talk	Y	Clients		Knowledge Sharing		
	Google Groups	Y	Clients		Knowledge Sharing		
	Blog	Y		CEO to all			
	Weibo	Y			Opinion Leadership	Potential Employees	
	Google Apps/Docs	Y	Clients		Knowledge Sharing		

Note: Y-Yes, N-No